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ABSTRACT

Designed for educational administrators, this manual provides suggestions for reducing educational unit costs in Latin America without reducing the quality of the education. Chapter one defines unit cost concepts and compares the costs of the Latin American countries. Chapter two deals with the different policies which could affect the principal cost components and it describes the instruments needed to implement the respective policy. The policies under examination include double shifts, consolidation, year-round school, volunteer teachers, regional cooperation, use of lower cost factors in textbook production and classroom construction, radio and television courses, programed teaching, reduction of teacher dropouts, changes in teacher-training systems, reduction of teacher-education credit requirements, and changes in the salary scale. Chapter three offers a brief, general summary and conclusion. A bibliography and a series of case studies that illustrate how the different policies have been used in Latin America to reduce costs are also included. (DE)

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MANUAL FOR REDUCING EDUCATIONAL UNIT COSTS IN LATIN AMERICAN COUNTRIES

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MANUAL FOR REDUCING EDUCATIONAL UNIT COSTS IN LATIN AMERICAN COUNTRIES

Centro Multinacional de Investigación Educativa (CEMIE) - OEA
San José, Costa Rica, March 1974

Paper prepared in compliance with contract No. AID/CM/TA-C-73-37 between the Agency for International Development and the Multinational Educational Research Center, based on the document "Minimizing Unit Costs of Education in Developing Countries" by Donald R. Winkler.

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INTRODUCTION

> "From the Second World War onward education has come to be the world's major branch of activity as far as global expenses are concerned". *

Latin American countries, as well as those of all other regions of the world, are facing a growing demand for educational services, a situation already presenting critical characteristics.

The so-called demographic explosion has caused a greater "educational explosion" with all its resultant political, administrative, pedagogical and financial problems for the various national educational systems.

Between 1960 and 1968 the world's population increased 2% each year while the school age population (between 5 and 19 years) had a 2.35% yearly increase.

In Latin America, the population increase has taken place more rapidly than in the rest of the world with a growth rate of 2.8% during the period of the 1960's. The population of Latin America in 1960 was 198 million, in 1965 there were 228 million inhabitants, and in 1970 262 million. It is estimated that there will be about 350 million by 1980.

The Latin American school age population (from 5 to 19 years) increased 28% from 1960 through 1968. In the first year there were 75 million inhabitants in this age group and by 1968 the number had increased to 96 million. This "educational explosion" has created

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* Edgar Faure Et Al Aprender a Ser (TO LEARN TO BE). UNESCO 1972 p. 60.

strong pressure on the various national educational systems of Latin America.

A world-wide characteristic of present times as far as education is concerned, is the strong trend of the countries towards universal education at all levels. In Latin America, the figures have increased rapidly. While in 1960 students registered in primary schools were 24 million, in 1971 42 million were registered. This meant that in 1960, out of every 100 children in the primary level school age, 48 of them were registered at school. This figure increased to 60 by 1971.

The number of persons in secondary school age registered in 1960 was 13 out of a 100 and in 1971 the figure went up to 27.

This expansion of educational systems has brought about a growing demand for teachers, buildings, materials, administrative services, etc., a demand which has required and will continue to require a massive increase of funds.

The increase of educational expenses makes up the financial dimension of the so-called "world educational crisis". Everywhere, the expenses in education have been growing rapidly during the last two decades, not only in absolute terms, but also as a percentage of national product and of total public expenses.

The proportion of expenses for education have tended to increase within the national budgets. In Latin America in 1960, 12.6% of the national budgets went for education; in 1965 this percentage had gone up to 15.4%. This happened because the educational systems have required and will continue to require larger funds; however, these funds and national budget percentages destined for education have reached, or will reach, their limit.

In developing countries especially, the following facts weigh upon education:

1. The demand for education, caused by population growth, is increasing rapidly. Even more important, the school age population is growing more rapidly than the total population. All this has caused education to acquire characteristics of a national enterprise, one which consumes great quantities of resources both in absolute and relative terms.

2. Scientific and technological advancement in all fields forces educational systems to rapidly and constantly up-date contents and methods in order to adapt them to contemporary realities.

3. Education has been placed at the top as far as its role in national transformations is concerned. The needs for economic and social development and the appearance of new employment opportunities have engendered strong pressure on educational systems. Society continues to place new demands on education.

Many authors have studied educational problems in the developing countries. One way to face these problems has been to supply education with an adequate quantity and quality of resources, but as has been seen, demand for these resources grows very rapidly. Educational expenses absorb increasingly higher percentages of national products and budgets.

In Argentina, for example, public expenses in education absorbed 9.7% of the national budget in 1961. This percentage increased to 11.4%

in 1965 and to 16.3% in 1972. In Mexico the percentage was 15.7% in 1961, 24.1% in 1965 and 24.3% in 1972. And these increases cannot continue to grow indefinitely, since in turn, other aspects of national development demand sufficient resources.

The seriousness of the matter is reflected in the fact that this is a time when societies need to increase educational opportunities without delay in order to accelerate their national development. Obviously, to be successful in this venture, Latin American countries will have to reduce the unit costs in education to a minimum, in order to be able to satisfy growing social demands with their budgets.

Some of the more crucial problems which affect educational development in Latin American countries are the following:

1. Population Characteristics

Latin America has a young population. In 1968 the population in the 0 to 24 age group was 42% in Europe, 47% in North America and 61% in Latin America. This increases educational needs considerably, as a high proportion of the population requires educational services, while only a small percentage of the population is working and producing.

2. Equal Opportunities

Developing nations place great emphasis in universal education at all levels. Latin American Constitutions set forth the State's obligation to supply basic education to all its inhabitants. Obviously, there is a discrepancy between what is being proclaimed and what is being done. In 1967-68, 75% of the Latin American population of primary school age was enrolled in schools. Of the population at the secondary age group, a 35% was enrolled at all levels. The lack of equal opportunities is more critical in rural zones and among the lower social classes. To attract resources to disfranchised groups and sectors of the population is a very costly venture in education.

3. Dropouts and Repeaters

The proportion of students starting first grade and finishing primary school six years later is very low in Latin American countries, as it is in other developing regions. This means that educational systems suffer serious deficiencies as a result of the high scholastic loss and wastage caused by dropouts and repeaters. This loss increases the cost per graduate in education. (See Annex 2, Model 1.)

In the Republic of Argentina, of 705,192 students enrolled during the first year of elementary education in 1963, only 317,099 arrived at the last (7th) year in 1969. This means that of every 100 students entering only 45 were successful in reaching the last year within that level in the normal period of time.

In Guatemala, out of every 100 students enrolled in first grade of primary school in 1967, only 20 enrolled in the last year (6th) of the primary level in 1972.

On a cohort covering 1964-1969, only 33% of the students enrolled for the last year (6th) of primary school in Costa Rica.

4. Poorly Trained Personnel

In order to improve educational quality and to insure greater efficiency of educational processes, there must be adequately trained personnel available, especially teachers well trained in teaching methods as well as in the subjects they teach.

The preceding are some but not all of the most serious problems affecting education in Latin America.

In view of this situation, these educational systems must become more efficient and reduce educational unit costs to a minimum.

The purpose of this manual is to present suggestions for the implementation of policies tending to reduce educational costs, without affecting the quality of the educational process.

Since total expenses shall continue to increase as enrollment increases, the concept of reducing costs to a minimum shall refer to unit costs.

CEMIE hopes that this manual will be an aid to persons who are responsible for educational leadership, who make decisions on educational policies, and who design, implement or evaluate educational development plans. The policies herein presented refer to primary and secondary education in the public sector, since universities in Latin America are usually autonomous with their own special problems meriting a different approach.

In Chapter I various cost concepts and definitions of unit costs are developed. In addition, information is presented showing the differences in unit costs among the countries and regions of Latin America and among several educational levels (Table 2). The chapter deals also with the cost components in primary and secondary education and presents variations in cost structure in selected countries of Latin America (Table 1).

Chapter II deals with the different policies which could affect the principal cost components, and describes the instruments needed to implement the respective policy. Each instrument is presented and its meaning and operating methods are explained. The advantages, disadvantages and implications are described.

Chapter III includes conclusions of a general nature concerning the material presented.

A bibliography related with the theme and a series of cases illustrating the application of different instruments which have been used in Latin America to reduce unit costs are added as annexes to the manual.

CHAPTER I

COST ANALYSIS IN EDUCATION

A. INTRODUCTION

There are two problems to be studied in reference to costs of educational services:

1. How much education to supply and at what levels;
2. How can a given quality of education be supplied with a limited budget to the greatest number of students.

The first problem refers to a study of the external efficiency of the educational sector; the second problem pertains to studies of internal efficiency.

The second problem referring to internal efficiency can also be approached as follows: How to supply a given level of educational services at the lowest possible cost? This is the main approach set forth in this paper. In this sense, one tries to answer the following question: "How can the unit costs of educational services be minimized in developing countries?"

It is very important to answer this question, since even the smallest changes in unit costs can have a great impact on the national education budget.

There are at least three ways to reduce unit costs (to improve internal efficiency):

1. To produce a more effective combination of the costs of the

academic inputs (for example, to achieve more product with a given level of expenses).

2. To improve the organization and the operation of the school.
3. To use new technologies.

To succeed in making an educational system efficient in terms of costs, some knowledge is required on how different inputs affect the amount of product or results.

Technically, an efficient educational system requires that the ratio of marginal product* to price be equal for all academic inputs. This condition allows substitution of high cost inputs (teachers with a high degree of training) for lower cost inputs (teaching assistants). Improvement in organization and operation of the school requires changes in the use of school inputs. For example, the curriculum could be revised to have students graduate in a shorter period of time, or the administrative sector could be reduced by abolishing the system of inspectors.

New technologies differ in the degree, not in kind, from the types of changes included in the second category. New technologies such as the use of educational television or programmed instruction may involve a dramatic reorganization of school inputs.

Each of the ways through which unit costs could be reduced are amply discussed in this paper. However, first we will define "unit cost" and then we will classify these costs in education.

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*Marginal product is understood to be the increase in the product due to an additional unit of input.

B. DEFINITIONS OF COST

The total costs needed to supply a given quantity and type of educational service, such as vocational training or literacy training, are the sum of capital costs and variable costs.

Capital Costs: Capital costs are fixed or constant with regard to changes in the quantity of results obtained. The costs to construct a school could be considered as capital costs, but the value of the investment must be distributed throughout its useful life. In any case, the result is the number of students attending school.

Capital costs have two important characteristics:

1. Within the space limits of a school building, the average capital cost decreases as the number of enrolled students increases.

2. Capital costs have a maximum point, since once the capacity limit of a building is surpassed, a new one must be built if one wishes to admit more students.

Variable Costs: Variable costs change according to the number of enrolled students. In this example, textbooks are a variable cost.

If each student is to have a textbook, the total variable cost per year is obtained simply by multiplying the price of the textbooks by the number of students and by dividing the product by the number of years of useful life. Variable costs always increase as the number of students increases, but do not necessarily increase at the same rate as each new student is added.

The sum of capital costs and variable costs, divided into the number of enrolled students, is called the average total cost per student, or unit cost in education. In this paper we understand by "unit cost" the annual cost per enrolled student. Some authors also consider "unit cost" as the average cost to educate a student at a minimum level. The most important difference between these two concepts is that the latter takes into account the dropout (or "wastage") of students, while the former does not. The high dropout rates existing in developing countries make this difference a very important matter. Depending on the definition of unit cost used, the implications for an action plan could differ considerably. It is possible to reduce unit costs of enrolled students without reducing in any way those of students educated up to a given level (usually called average cost per graduated student).

For example, if a 200:1 student/teacher ratio is adopted, the costs of enrolled students will be reduced, but the result may be a very high ratio of dropouts, which would increase the cost per graduated student.

When discussing ways to reduce unit costs in education we also define unit cost as being the annual cost to supply a given level of quality of educational services to each enrolled student. In other words, as stated in this document, cost reductions do not reduce the quality of the education obtained by each student. The latter remains.

Other unit cost measurements include:

- Capital cost per space/student
- Capital cost per space used by a student
- Average cost per teacher
- Cost per classroom
- Cost per school
- Cost per course
- Cost per unit of area or volume (square foot or meter, cubic foot or meter)
- Opportunity cost of the capital invested per student
- Family cost per student
- Opportunity cost per student

It all depends on which unit is most appropriate for establishing the costs of the aspect in which one is interested. If one wishes to establish the costs of a needed quantity of pencils and textbooks or of food expenses, then the individual student is the most appropriate unit, because in these cases the cost varies as a direct ratio to the number of students involved. But if one is estimating the needs for teachers, desks, maps and teaching materials, then the classroom would normally be the best unit, since the personnel and equipment needs vary depending on the number of classrooms and not on the number of students. When estimating the heating and lighting costs, the measurements of per square or per cubic meter are the most appropriate.

Variation in Unit Costs: It would not be exact to suppose that unit costs in education are constant or invariable with regard to such items as: teaching levels, types of education, regions within the country, efficiency of the system, student/teacher ratio and the way some technological innovation is applied.

In Guatemala, for example, the unit cost per passing student in secondary education was five times higher than that of the passing student in primary education. Likewise, the difference of unit cost between enrolled and passing students is rather appreciable at both levels. At the primary level the unit cost per passing student was 50.3% higher than that for enrolled students; in secondary education this difference was 124%.

In Venezuela, technical agricultural education has a cost which is 70.3% higher than industrial education and 221% higher than commercial education. These variations are affected primarily by a greater cost for installations and by a lower teacher/student ratio.

In Costa Rica, education in rural zones is more costly due to the increased wages which have to be paid to educators because of the remoteness and lack of comfort of the areas in which they work. This salary is consistant throughout the country within each educational level. In the most remote areas a maximum of 47.5% over the base salary is presently being paid.

The efficiency of a system also produces a change in the unit cost per student. Repeaters are a serious problem in many Latin American countries, including those having the greatest educational development. Such is the case in the Republic of Argentina where the percentage of repeaters is 25.9% in the first two grades of primary education. In that country, secondary education also shows a high unit cost. Full-time employment is defined as a minimum of only 12 hours per week plus some requirements in order to apply for employment. This permits some educators to hold three teaching positions at the same time and collect three full salaries.

The student/teacher ratio influences the change in unit cost. There are countries where the ratio is 1:15. This is true mainly in the rural areas and in the one-room schools which have only one teacher. Also, in some countries higher salaries are earned when an alternating schedule is used. In practice, the number of contact hours of the teacher and the student are greatly reduced.

In Costa Rica, at present, extra pay is granted for teaching in alternating schedules. This is calculated as 25% of the base salary, despite the fact that the average number of students is lower and the hours of contact with them are less then those set forth in the regulations. In countries where some technological innovations such as television are applied in an effort to aid the teacher in the classroom or in remedial classes for students, the cost tends to increase. In the former case, this occurs in Colombia and in El Salvador because television does not take the place of the teacher and in the second case in Venezuela where it is used during vacation time to offer courses to secondary education students who have not passed during the school year, to enable them to pass to the next grade.

In the State of Sao Paulo, Brazil, an experiment has been developed in radio and television for adults wishing to obtain high school degrees or diplomas. In this case, students are assisted by a professor and a monitor from different television and radio stations. In 1971, tests were given to 4,146 students of the secondary level in the first grade of the school system (4 to 8 years).

Only 10 out of each 100 students passed all subjects (exactly 9.93%). The cost per student in this case is undoubtedly high.

Another reason why unit costs vary is that the structure of teaching salaries has components which are completely foreign to the system's yield. In Venezuela, an extra wage equivalent to nine years experience is paid for each child of the educator. This means that married educators with children may earn higher salaries than other teachers not having this social bonus, irrespective of their contribution to the yield of the system.

Table 1 is included to compare the educational expense distribution and its principal components. It contains the percentage absorbed by each of the inputs (teachers, buildings and maintenance, educational materials and supplies, and administration) at the pre-primary and primary levels in five Latin American countries: El Salvador, Ecuador, Venezuela, Paraguay and Mexico.

The table possibly contains some errors since the computations were made based on information obtained from a variety of sources. Thus, the criteria on the presentation of results vary from country to country. In general terms, we believe, however, that the comparisons among countries are acceptable.

As can be observed, the greatest educational expense percentage is invariably absorbed by the input "Teachers". Thus, it should be granted priority within any strategy of educational financing aimed at reducing unit costs to a minimum.

In this table the countries are listed according to the percentage magnitud of the highest component (teachers). It can easily be noted that all countries compared show a similar trend.

The instruments described in Chapter II of this manual facilitate the achievement of a significant reduction in the unit costs for each of the components.

TABLE 1

PERCENTAGE OF TOTAL EXPENSE ABSORBED BY EACH COMPONENT IN EDUCATION

(Pre-primary and Primary)

Cost Component / Country	PERCENTAGE				
	Teachers	Buildings & Maintenance	Materials & Supplies	Administration	Total
El Salvador (1970)[1/]	88.78	2.26[2/]	0.46	8.50	100.00
Ecuador (1970)	86.36	11.86	0.72	1.06	100.00
Venezuela (1971)	84.36	5.06	0.95	9.63	100.00
Paraguay (1971)	80.16	7.32	1.37	11.15	100.00
Mexico (1971)	62.98	18.11	1.05	17.86	100.00

[1/] The number in parenthesis represents the year the information was given.

[2/] Includes only rents.

C. COST PER STUDENT IN CONNECTION WITH THE GROSS DOMESTIC PRODUCT PER CAPITA

In this section of the manual we felt it would be appropriate to include some figures regarding unit costs in education, applied to the different levels and types of education in some Latin American countries, This is provided to enable the reader to make comparisons.

One way to facilitate the comparison of costs per student among countries or educational types and levels is to compare these costs with the per capita Gross Domestic Product. A comparative table which compares information on costs per student in 12 Latin American countries has been prepared.

The information has been taken from different sources* and may contain some discrepancy with reality. However, in general terms the table enables us not only to make comparisons among countries, educational types and levels, but also to gain a general outlook on the problem in Latin America.

In some cases the costs used include investment costs and the student's opportunity costs. In other cases, they only refer to operating costs.

The formula to obtain the comparison index is simple and is described as follows:

$$c.r. = \frac{(X)}{Y} \; 100$$

in which:

c.r. = Cost per student as a percentage of the GDP/per capita

X = Cost per student in absolute terms

Y = Gross Domestic Product/per capita

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* - Yearly reports of the Inter-American Development Bank

- International financial statistics of the International Monetary Fund

- Memoirs, reports and statistical studies of the countries described.

TABLE 2

COST PER STUDENT AS A PERCENTAGE OF THE PER CAPITA GDP

(12 Latin American countries)

Country	Year	Per Capita GDP in Dollars	Primary	Secondary	Industrial	Commercial	Agricultural	Normal
			%	%	%	%	%	%
Argentina1/	1970 3/	1,039.0	8.75					
Brazil 2/	1969	409.0	12.31	22.92	50.56		243.48	21.02
Costa Rica	1971	553.4	15.53	30.32	59.47	64.24	74.25	45.65
Colombia	1971 3/	361.9	9.61	22.80	38.14	27.44	51.9	40.68
Ecuador	1969 3/	270.0	14.90	65.95 4/				
El Salvador	1970 3/	303.6	11.96	15.66	59.53 5/			
Guatemala	1972 3/	376.6	9.45	32.42 4/				
Mexico	1971	683.2	4.95	19.12 4/				
Panama	1972	779.1	10.65	40.69 4/				
Paraguay	1971	271.1	9.38	31.22	48.45	17.98		19.30
Peru	1972 3/	477.6	12.94	24.06 4/				
Venezuela	1971 3/	1,037.1	13.56	21.10	38.87	20.57	66.21	57.86

1/ Santa Fe Province
2/ Sao Paulo Province
3/ Includes only operating costs
4/ Secondary education average
5/ Commercial, agricultural and industrial education average

Prepared by: CEMIE/OAS

In spite of the limitations experienced during its preparation, the preceding table allows us to draw some conclusions:

1. In primary education, the percentage of the per capita GDP absorbed by each student varies from 15.53% in Costa Rica to 4.95% in Mexico. The arithmetical mean for the twelve countries covered in the table is 11.16%.
2. In secondary education, the percentage varies from 65.95% in Ecuador to 15.66% in El Salvador. In this case the arithmetical mean for the eleven countries taken into account is 29.66%.
3. In six Latin American countries covered, the percentage for industrial education varies from 59.53% in El Salvador to 39.14% in Colombia. The mean is 49.17%.

As can be deduced from the above figures, industrial education is more expensive than secondary education, and the latter, in turn, is more expensive than primary education. Secondary education in Ecuador is five times more expensive than primary education, and industrial education in El Salvador is five times more expensive than primary education.

If the arithmetical mean of the primary level is taken as a unit, the index for the secondary level is 2.66 and for industrial education 4.41. Similar comparisons can be made with the types of commercial, agricultural and normal education.

CHAPTER II

INSTRUMENTS TO REDUCE UNIT COSTS IN EDUCATION

A. GENERAL EXPLANATION

This Chapter will cover some suggested forms to reduce unit costs in education. For example, instruments like double shifts, use of educational television, etc., permit reduction of costs in the different components of educational expenses, such as: teachers, administration, buildings and maintenance, and materials and supplies.

Now, for each component there are effects caused by the instruments mentioned in this manual. Some of these effects are: 1) increase of the student/teacher ratio, 2) reduction of administrative personnel, 3) reduction of the number of buildings needed, 4) reduction of the amounts of materials and supplies needed, etc.

Table N° 3 includes the most important cost reducing elements and indicates the way they affect the different kinds of inputs of educational cost.

The implementations or instruments described in this chapter are: double shifts, consolidation, year-round schooling, team teaching or use of volunteers, television and radio, regional cooperation, use of cheaper materials, programmed instruction, reduction of teacher wastage, changes in the teacher training methods, reduction of the number of credentials and degrees in salary schedules.

The structure for the development of each instrument begins with a description which explains the contents and the implementation procedure to the reader. Secondly some of the effects on the different components of educational cost are indicated. Then it points out some of the advantages and disadvantages that can be observed. Finally, the evaluation and implications which may arise from the application of the instrument are described.

Thus, the reader is offered the most complete picture of the instruments which are made available in this manual.

TABLE No. 3

ALTERNATIVE METHODS OF REDUCING UNIT COSTS OF SCHOOL INPUTS

Components of Educational Cost	Administrative Instruments Dimensions of the Different Cost Components	Double shifts	Consolidation	Year-round schooling	Team teaching or use of volunteers	Regional Cooperation	Use of cheaper means	Television and radio	Programmed teaching	Reduction of teacher wastage	Change in teacher training methods	Reduction of credentials and degrees; change in the salary schedule
Teachers	Increase student/teacher ratio		X		X			X	X	X		
	Reduce average salary of qualified teachers	X		X	X							X
	Reduce cost in teacher training and increase the number of teachers			X						X	X	X
Administration	Reduce the number of administrative personnel	X		X								
Buildings and Maintenance	Reduce the number of buildings	X	X	X				X				
	Reduce building costs				X	X	X					
	Reduce maintenance costs				X							
Materials and Supplies	Reduce the amount of materials and supplies needed	X		X				X				
	Reduce the price of the books	X	X			X	X	X				

Prepared by: CEMIE/OAS

B. DOUBLE SHIFT

Description

The double shift - also called double schedule and alternate schedule- represents a way to increase the capacity of educational facilities. Instead of working with one group, one works with two groups during two shifts.

In some cases, the double shift makes it possible to handle one group in the morning and another in the afternoon in the building; but the teachers and the administrative personnel are different in each shift. This generally occurs in urban areas not having enough buildings. The purpose of this double shift method is to increase the number of students per building, without reducing the space available for each student. In Venezuela, for example, a double shift school is defined as one in which one group of students attends in the morning and another group attends the same school in the afternoon. The personnel is also different in each shift. In other words, two "schools" use the same building.

In other cases, the same teachers handle different groups of children in each shift. This generally occurs in rural areas where the lack of teachers forces the existing ones to cover the unsatisfied demand. In this case, the purpose is to increase the number of students per teacher, either by shortening the class periods or by increasing the number of the teacher working hours.

In Costa Rica, for example, legislation provides for the existence of alternate schedules with the same teacher and different student groups. The teacher receives an inflated salary, equivalent to 25% of the base salary, to handle a second group with the same number of students during the same number of hours. In practice, the teachers reduce the school day and reduce registration, with the result that the extra salary really represents an 88% increase for each extra student group.

In El Salvador, the teacher works more hours and the extra salary he is paid increases in a lower proportion than the increase in his teaching load.

The double schedule or shift is an implementation which has been generalized in many Latin American countries. In most of them it has been introduced due to the lack of school buildings, and in others for the purpose of integrating the elementary or primary school. In Costa Rica and El Salvador extra salaries are paid to the same teacher to take care of two different student groups. However, this extra salary is less than the increase in working hours.

Cost Reduction

The double shift permits unit cost reduction in some inputs (teachers, administration, materials, buildings) of the formal educational system. Some effects on the cost components may be expressed as follows:

Teachers

By using the double shift it is possible to reduce the average salary of the teachers per student. This is so because the same teacher takes care of two groups of students with an equal number of hours for each group, but with an extra salary lower than the regular salary.

Example 1

Case A. Teacher X

Handles a group of 100 * students during an eight hour shift.

Salary: $1,000 monthly

Unit Cost: $10 per student (1000/100).

Case B. Teacher X

Handles 200 students divided into two groups of 100 students each.

In 2 shifts of 5 hours each

Salary: $1,250 Monthly

Unit Cost: $6.25 per student (1,250/200)

The unit cost decreased from $10 to $6.25, meaning 37.5%.

Example 2

Case A. A teacher earns $1,000 monthly and handles a group of one hundred students during a 4-hour shift.

Case B. The same teacher handles two groups of 100 students each and the group will have 4 contact hours with the teacher; but hours N° 3 and 4 of the first group will coincide with hours N° 1 and N° 2 of the second group (therefore, adequate spaces are required). During these two hours, subjects such as manual work, music, physical education, etc. will be included.

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* The figures appearing in the examples are used to make the calculations easier, therefore, they should not be interpreted as suggestions as far as numbers of students per group or salaries are concerned.

In this way, the teacher will remain at the school for an additional period equivalent to 50% more than in the first case and will earn $1,500 per month.

The unit cost for teacher/shift would be $1,000 in the first case, $750 in the second case. In other words there would be a 25% reduction.

Example 3

A variant of Example 2 permitting a greater reduction is to pay the reacher $1,250 per month. In this case, the cost per teacher/shift would be lowered from $1,000 to $625, meaning a 37.6% reduction. These are some examples illustrating the way to reduce the expenses with regard to teacher salaries.

It could also be considered that by increasing the teaching hours of each teacher, fewer teachers would be required, thus producing two saving sources:

1. Reduction in expenses to cover social services (retirement, health insurance, etc.);
2. Reduction in funds needed to finance programs for pre-service and in-service teacher training.

Administration

The double shift permits some savings in administrative personnel, because the same employees will cover the needs without a salary increase.

The same criteria used for teaching personnel can be used for administrative personnel.

Buildings and Maintenance

If through the double shift the number of students per building is increased, there will be a considerable saving in building costs, since the number of buildings needed to satisfy the educational system demands would be reduced.

It is probable that there will be savings per student and per classroom as far as maintenance and repairs is concerned.

In Venezuela it is estimated, that when two shifts are functioning, there is a utilization increase varying from 90% to 100%, which presupposes approximately a 50% decrease in cost per unit.

Materials and Supplies

The utilization of space in a double shift arrangement facilitates the use of existing materials in the building for a greater number of students. For example: blackboards, globes, maps, charts, flannelgraph, boards, dioramas, etc. are used for a greater number of students. The result is a reduction in purchasing expenditures for these materials, since they will not have to be duplicated for two different groups.

When the school supplies the books, there is a unit cost reduction because the same book can be used twice (in each shift).

Student notebooks and similar materials, however, do not produce savings in costs, because they can only be used once.

Other Advantages

The principal advantages of the double shift may be summarized as follows:

1. It permits a reduction in fixed costs;
2. Building costs do not increase if enrollment increases;
3. Opportunity costs decrease*. In this regard it can be stated that when the students are able to find part-time employment -especially secondary school students- the opportunity costs by remaining at school decrease. It is probable that the dropout rate will decrease, since by working the students can remedy their financial problems which are one of the causes of school dropout.

Disadvantages

Some disadvantages which may occur in the double shift are the following:

1. A decrease in the quantity of educational services offered to students could negatively affect student achievement.
2. Activities and the economical situation of the home may be effected if children attend different shifts. (This can be eliminated if students are assigned shifts in alphabetical order.) For example, transportation costs and the time required to pick up the children increase.
3. Students spend more time without parential supervision because if the parents are working the student who attends school in the morning will be at home alone in the afternoon.

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* Opportunity cost is the benefit one stops receiving when selecting one alternative instead of the other. For example: when a person decides to study fulltime, no salary is earned. The unearned salary is the opportunity cost.

Evaluation and Implications

Double shifts are especially useful in cases when enrollment can not be increased because of a lack of sufficient teachers or classrooms.

The capacity of the educational system is almost doubled, when a double shift is used instead of a single one.

More information is needed on the effects of the double shift on the learning and achievement of the students and on the repeater and dropout rates in schools.

Adopting the double shift implies a curriculum reorganization which requires a review of contents, methods and the distribution of student time in educational activities.

C. CONSOLIDATION

Description

In this manual consolidation means the process through which several small schools (by the number of students and/or by the courses offered), disseminated throughout a region and at times isolated from one another, are integrated in one institution offering educational services in a coordinated manner.

The "main reason" for consolidation is related to the well-known phrase: "Union makes force". In the terminology of economists, one could say that by consolidating, economies of scale can be obtained by grouping small units together.

In their eagerness to obtain highly efficient and effective services, educational leaders have viewed consolidation as a means to achieve their goals.

Countries of all stages of development have implemented consolidation plans: Norway, The Soviet Union, The United States, Colombia, Peru, etc. The magnitud, complexity, and goals have varied from country to country; but in all cases there is concern to concentrate efforts to avoid duplication and to increase the resultant efficiency of educational services. The idea of consolidating educational services has been included in rural and community development projects. With this criteria it is applied in Latin America.

Costs Reduced by Consolidation

Independent from the complexity and goals characterizing a consolidation policy, certain savings in educational costs can be obtained when several small schools are consolidated. Let us consider some cases concerning different inputs:

Teachers:

Consolidation permits an increase in the number of students per teacher. When in some school enrollment of students per teacher decreases, the number of groups of students can be optimized and the number of required teachers lowered. This increase in students per teacher will obviously result in a reduction of expenses for salaries of teaching personnel.

Example:

Scattered Schools

School	Enrollment per Grade				Teachers (1 per grade)	Monthly Salaries ($100. per teacher)
	1	2	3	Total		
A	30	10	10	50	3	300
B	25	15	15	55	3	300
C	25	15	15	55	3	300
Total	80	40	40	160	9	900

Consolidated Schools

School	Enrollment per Grade				Teachers (1 per grade)	Monthly Salaries ($100 per teacher)
	1	2	3	Total		
Central School	40	40	40	120	3	300
Satellite	40	-	-	40	1	100
Total	80	40	40	160	4	400

Explanations

1. In a region X there were three scattered schools that were consolidated into one "central school" and one "satellite".
2. The 80 first grade students who previously were in groups of 30, 25, and 25 students and who were handled by 3 teachers, were distributed into 2 groups of 40, one located at the headquarter and the other in the satellite. In this way only two teachers are required.
3. The 40 second grade students who were in 3 groups of 10, 15, and 15 students and who required 3 teachers were merged into one group of 40 with one teacher who worked at the central school. The same method was used with third grade groups.
4. In the scattered schools, both individually as well as collectively, the student/teacher ratio varied from 10:1 to 30:1 (In general there was a 160:9 ratio or that is, 18:1.) The consolidation increased the proportion to 40:1.
5. The scattered schools required $900 per month for salaries; the consolidated schools required $400. In this particular case consolidation permits the reduction of the cost of monthly salaries from $900 to $400, which means a 56% reduction.

Administration

Centralization affects administrative expenses, decreasing initially the number of administrators, but increasing them if applied in excess.

Buildings

In the example given with regard to the input "teachers", we can see that the number of buildings needed decreases (from 3 to 2) or in other words, that the capital costs are reduced per enrolled student.

Materials and Supplies

The smaller number of buildings implies that the textbooks and other teaching materials can be purchased at lower cost since the distributor will require smaller efforts for the distribution, and consequently, it will be in a position to make larger discounts.

Advantages

In summary, the following advantages can be obtained through consolidation:

1. The redistribution of teachers permits greater efficiency of the system in that the student/teacher ratio increases.
2. The number of teachers needed decreases and consequently the total salary schedule of the teaching personnel will be less. For the same reason, the fringe benefits (retirement, insurance, etc.) and the costs for teacher training decrease.
3. The "surplus" personnel in a nucleus can be moved to places where a shortage exists.
4. The capital costs decrease since a smaller number of buildings is required.
5. The costs for materials decrease since they are purchased for a small group of large units and not for isolated schools. The

suppliers will receive larger orders and have lower distribution costs and therefore, will be able to offer considerable discounts.

Disadvantages

Consolidation creates transportation problems for teachers, students and administrative personnel. When students are required to travel from distant points to the Central School of the nucleus to attend higher grades, the costs of transportation increase.

For some students, the increased time required to travel from their homes to school, would take away time for other academic activities such as homework, reading, etc.

Evaluation/Implications

Consolidation may reduce capital costs per enrolled student since it permits a greater utilization of space and offers savings, through the construction of larger buildings. Notwithstanding the evident benefits of consolidation in the reduction of construction costs per student, studies conducted in El Salvador raise some doubts as it is shown that the unit cost per student in construction is greater in large schools than in small schools.

On the other hand, if consolidation requires construction of dormitories for students and teachers, savings resulting from greater utilization of space would be nullified by the operating costs which the dormitories require.

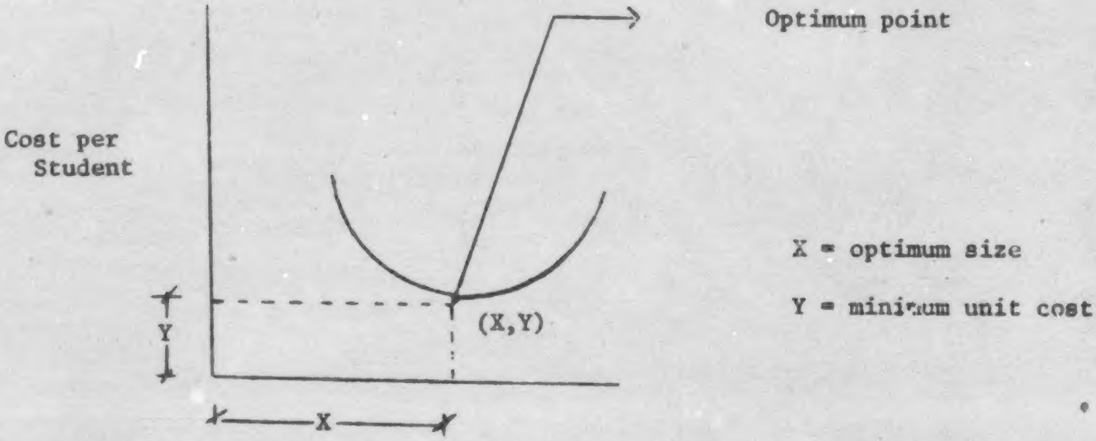
Consolidation shows better results at higher educational levels and in situations where a varied curriculum is offered. In this sense, consolidation is more beneficial at the secondary level than at the primary level; and within the secondary level, consolidation is more practical for technical schools than for academic secondary institutions. This is so because the higher the level, the greater the specialization required for the personnel. An agricultural school, for example, will require more special equipment than an academic school.

In this case, the high cost inputs will be better utilized with consolidation.

When consolidation is considered, one should take into account the "optimum size of the school" factor.

Studies conducted on savings achieved through consolidation have pointed out that these are obtained up to a certain enrollment figure. Beyond this limit there are no savings, but instead there will be "non-savings".

In a graph, the phenomena presents a curvilinear relation, as shown below:



The behaviour of the curve shows that when consolidation is considered one should determine, among other things, the optimum point which determines the size of the school (in terms of students enrolled) and which results in the lowest cost per student.

When consolidation is part of a national development strategy, it is worthwhile delimiting the geographical zones based on a regionalization plan complying with the country's development plans. Each nucleus should have a volume of school-age population which guarantees an adequate enrollment. Furthermore, the center of the nucleus should have such favorable conditions as access roads, central location, economic potential, etc., which make it the area's "center of atraction".

There are two interesting cases in Latin America: Peru and Colombia. The Peruvian approach established the entire educational system in terms of NUCLEARIZATION, which is a form of consolidation as it is defined in this manual. Colombia uses consolidation in rural development concentrations. The General Law of Education in Peru states that national education shall be organized according to the educational nuclearization system, and introduces the concept of the EDUCATIONAL NUCLEUS, or, in other words, "the communal organization as the basis for cooperation and development of educational services and other services used by it, within a given geographical area, for the integral development of community life".

Besides contributing to integral development, the Peruvian nuclearization seeks to insure an optimum utilization of educational facilities and equipment through the integration of the educational centers in "interconnected networks of a functional nature".

The Peruvian Community Educational Nuclei present certain variations in rural areas as compared to urban areas. While in urban areas there are three types of centers (Base Center, Educational Center and Initial

Educational Center) in the rural area there are four types: Base Center, Base Sub-Center, Educational Center and Initial Educational Center (Kindergarten).

In Colombia, consolidation of educational services has been adopted within the so-called rural development concentrations defined as "the community operating mechanism in rural areas, resulting in two central processes: the progressive integration of services, and the growing participation of the population served by them to reach higher levels of economic, social and cultural well-being, both individually as well as collectively ..."

These concentrations have an educational sector which has adopted what is called "the nuclear system" to organize schools, which integrate the educational services into a geographical zone with similar socio-economic characteristics.

Each concentration has three operating levels:

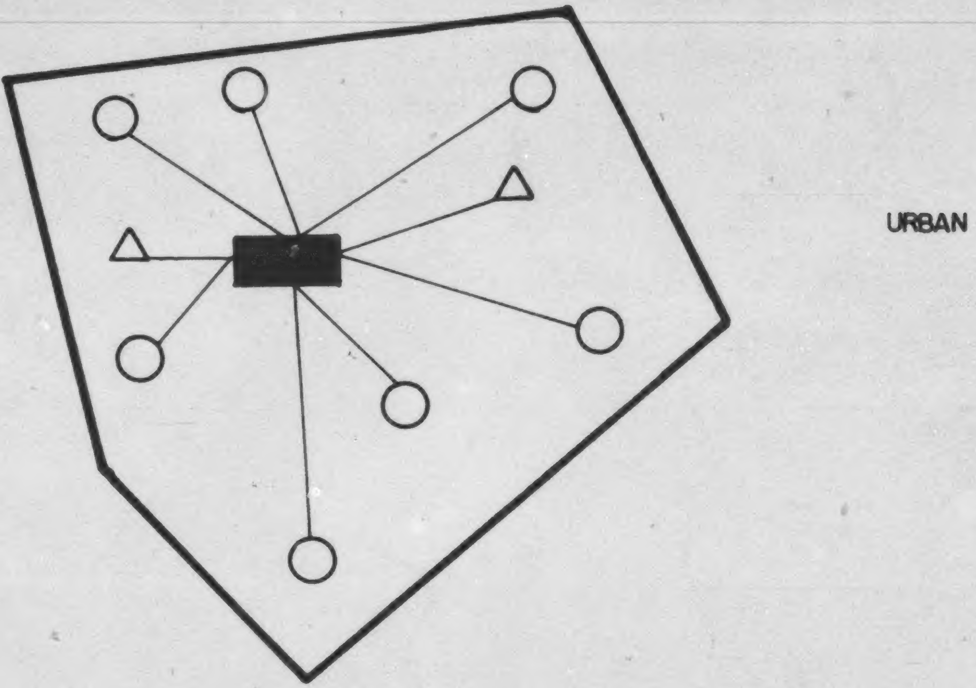
- Central School
- Satellite Schools
- Related Schools.

The Central Schools offer the nine grades of basic education and functions as the coordinating and integrating center for educational services. A given number of satellite schools offering elementary education from first to fifth grades depend on a Central School, according to their location; the students who complete fifth grade continue their basic education at the Central School. The so-called related schools are opened in rural areas with low population density and operate as one-room schools attended by only one teacher with an average of 40 children (both sexes) from first to third grades (in some cases from first to fifth grades).

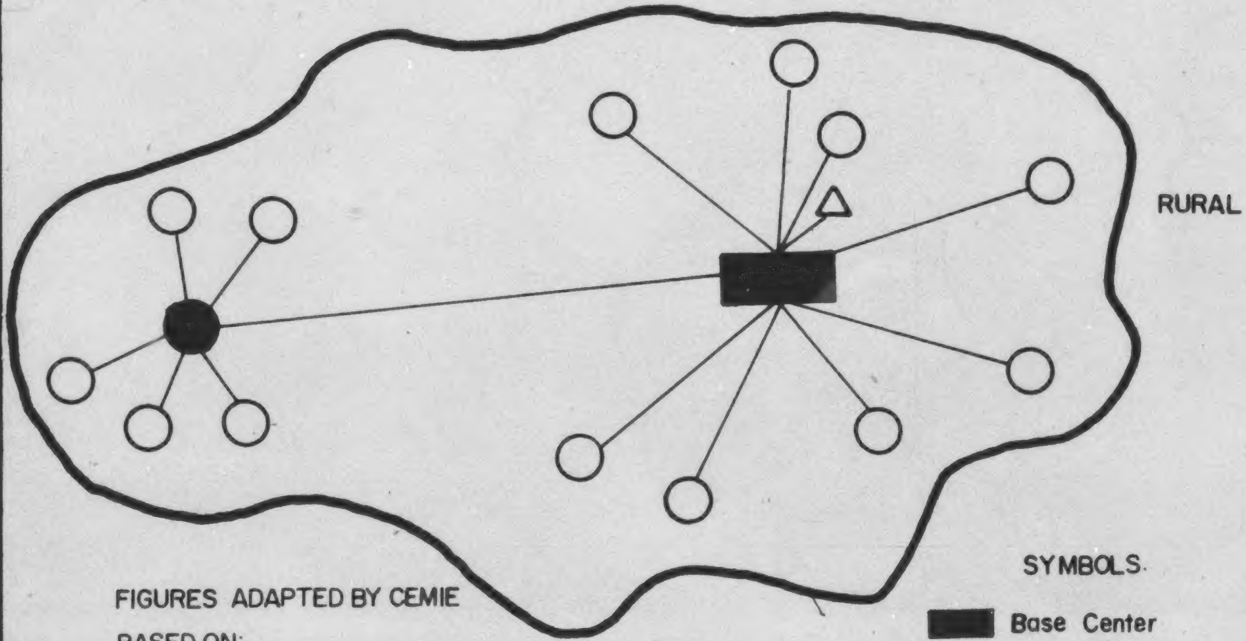
The Central School offers other complementary services besides educational ones, depending on the circumstance: room and board for teachers and students, multi-purpose rooms, cafeteria, student welfare and sport facilities.

FIGURE 1

COMMUNITY EDUCATIONAL NUCLEI IN PERU



Educational nuclei in rural area



SYMBOLS.

▬ Base Center

○ Educational Center

△ Initial Educational Center

● Sub-Base Center

FIGURES ADAPTED BY CEMIE

BASED ON:

Planning Office, Ministry of Education
NATIONAL PLAN FOR DEVELOPMENT, 1971,-75
Vol. VIII, Educational Plan,.
Lima, Perú

FIGURE 2

NUCLEARIZATION WITH COLOMBIAN RURAL DEVELOPMENT CONCENTRATIONS

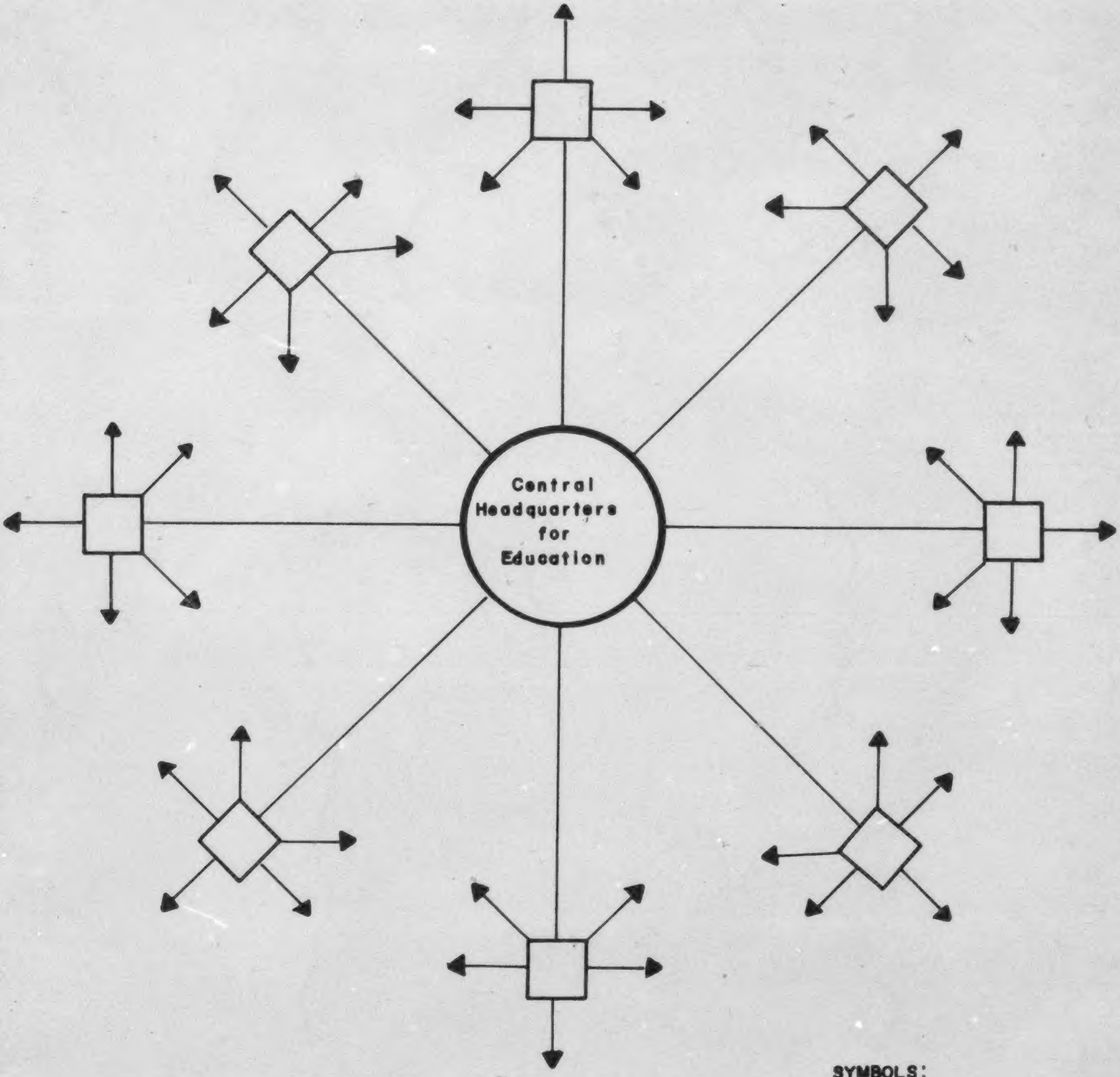

Central Headquarters for Education

Figure adapted by CEMIE, based on docmments of the "Instituto Colombiano de Construcciones Escolares", Colombia.

SYMBOLS:

☐ Satellite School

▲ Related School

D. YEAR-ROUND SCHOOL

Description

This alternative consists in utilizing the educational facilities during 12 months of the year: (1) to have the student spend less time in the system and (2) to increase the number of students per building.

It may solve the following problems:

- Shortage of school buildings
- Shortage of laboratories, shops and teaching materials
- Increased social demand for education
- Shortage of teachers
- High rates of educational wastage (drop outs plus repeaters)

In any case the deficiencies which are perceived will determine the criteria used to establish the year-round school system.

Criterion: To have the student spend less time in the system

If for example, the desire is to counteract the effects of high rates of teacher wastage or shortage, then a reduction of the time students spend in the educational system might be considered. Several ways have been suggested to achieve this goal: one would be to revise the curriculum in accordance with time factor, utilizing existing studies on the marginal yield for the years saved.

Another way could be the employment of inactive teachers, having them work during the vacation months for a salary lower than the regular salary, or simply use the regular teachers with an extra-salary, which in any case should also be less than the regular salary for the same period.

Now, in this manual another way which seems more advisable will be described: It consists in that, during the vacation period, students will advance to the next higher grade level. The student will be with the same teacher during the entire year. Thus, the time to reach a minimum educational level would be reduced without changing the present school structure (for example the six year primary school).

Classes thus offered on a year-round basis will allow students to finish six grades in 4-1/2 calender years. Furthermore, the dropout rate would decrease if it is assumed that the opportunity cost to them of staying in school is lower in the later grades because they are younger and have fewer job alternatives.

On the other hand, it would be necessary to change the teachers work schedule, to have him work for 12 months a year. Thus, after nine months of study, there would be a 20 day vacation period before continuing the courses corresponding to the next higher grade level.

There is no information available that this alternative has been suggested or experimented in Latin American countries.

Application of the Model to a Six-year Educational System

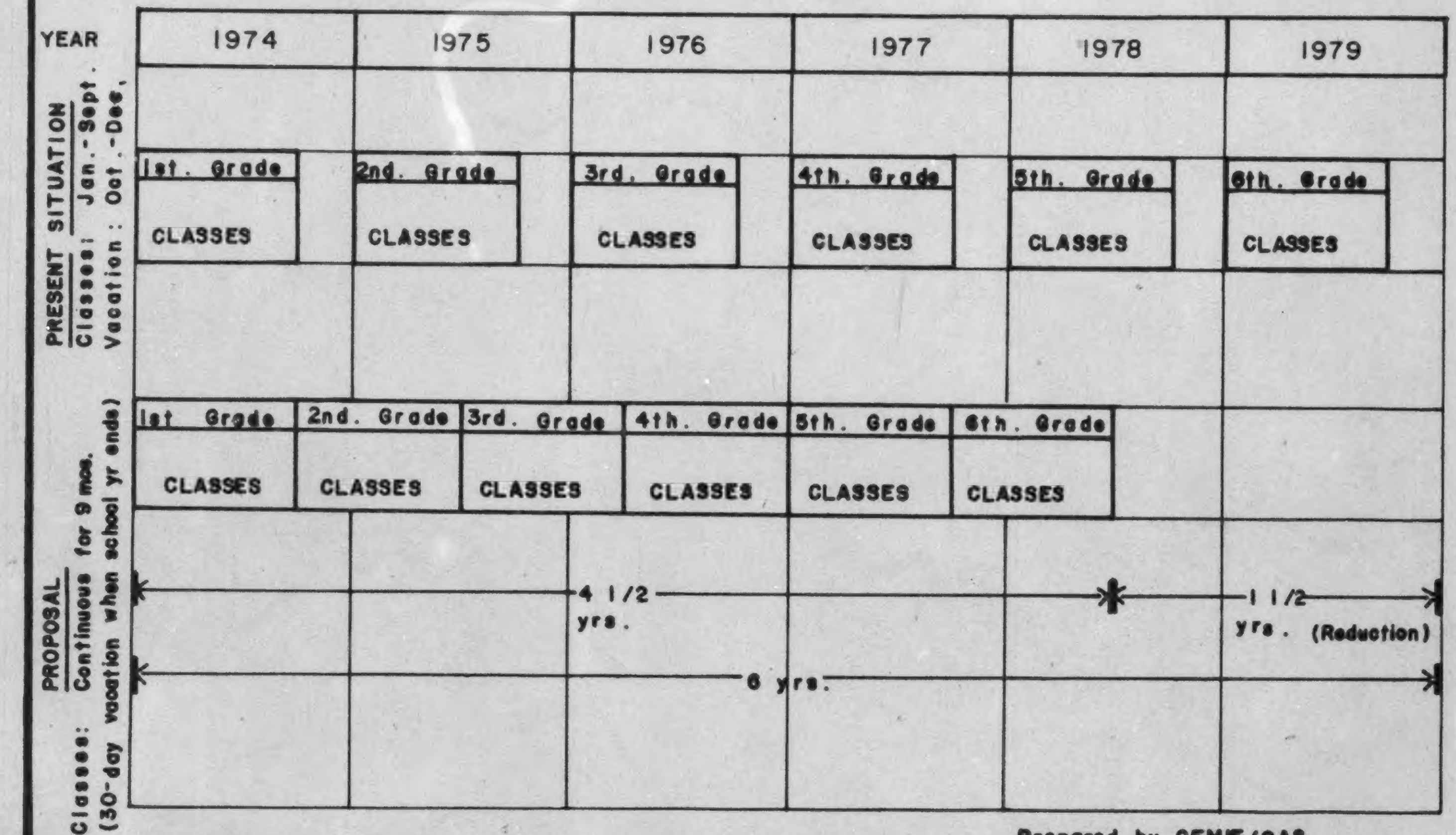
Study years to obtain the minimum level:	6
Calender years to conclude the study program:	
At present	6.00
In the suggested model	4.50
Difference in years	1.50
Reduced % reached	$= \frac{1.50 \times 100}{6} = 25\ \%$

The following graph will give a better idea of the preceeding model:

TABLE 4

PROPOSAL FOR THE ORGANIZATION OF SCHOOL ACTIVITIES TO REDUCE TIME THE STUDENT REMAINS IN THE EDUCATIONAL SYSTEM

(Primary Level)


YEAR
1974
1975
1976
1977
1978
1979
PRESENT SITUATION
Classes: Jan.-Sept.
Vacation: Oct.-Dec.
1st. Grade
2nd. Grade
3rd. Grade
4th. Grade
5th. Grade
6th. Grade
CLASSES
PROPOSAL
Classes: Continuous for 9 mos.
(30-day vacation when school yr ends)
4 1/2 yrs.
1 1/2 yrs. (Reduction)
6 yrs.

Prepared by CEMIE/OAS

Effects on Teacher Cost/Students or Graduates

1. The implementation of the model described would bring about a 17.5% reduction in the average salary of qualified teachers without reducing their present salaries.
2. If it is accepted that the students would lose fewer study years, a lower cost per graduated student would result.
3. The decrease of the demand for educators, through a greater utilization of their services, would result in a decrease in the costs of training and fringe benefits.

An Example Explaining the Reduction of the Teacher's Salary

A teacher X with a monthly salary of $100 receives $7,200 in 6 years.

A teacher Y with a monthly salary of $110, this due to a monthly increase of 10% as compensatory extra-salary for extension of classes. The teacher will receive in 4.5 years.............$5,940
Number of students graduated per teacher = 30
Then, the cost per graduated student would be:

With teacher X		$ 240
With teacher Y		$ 198.
Difference in cost		$ 42.
% reduction in salary to obtain the same product	$\frac{42 \times 100}{240} =$	17.5%

Effects on Building and Maintenance Costs /Students

1. The use of the buildings during 12 months of the year permits a larger enrollment by extending the period of study. Thus the

costs per student/building will be 17.5% less, and the building costs are reduced because the number needed decreased. Maintenance costs may increase but not in proportion to the additional use made of the facilities.

2. The use of shops and laboratories by more students reduces the quantity of equipment required, and consequently also the unit costs. However, it will be necessary to replace equipment more often due to wear through a greater use of the equipment. In the case of shops, some,not all tools and equipment, will have to be replaced at given times.

Effects on Material and Supply Costs/Students

Some materials, the number of which are calculated per classroom (blackboards, maps, flannelgraphs, dioramas, globes, etc.) may be used during a longer period, representing some reduction in costs. However, usable articles such as paper, paper mache, notebooks, pencils, etc., will require larger investments. With regard to textbooks, if each student has one, the quantity needed will increase, but, if they are placed in a library the unit cost will be lowered as the books are utilized by a greater number of students. Here, wear and outdating with the passing of time must be taken into account.

Effects on Administration Costs/Students

When the number of active educators decreases, the number of supervisors required will also decrease, (provided that it is assumed that their number is proportional to the number of teachers in service). This also will represent a reduction in costs for training and fringe benefits.

Disadvantages

1. This alternative may encounter strong resistance from teacher organizations because of the required changes in their working hours and habits.

The vacation period will be shortened, since they will have to adjust to the system which exists for all other public administration employees; namely, a period of 20 or 30 days of vacation at the end of each educational cycle.

2. It may be alleged that the usual vacation period in many countries -at the end of the year, during the summer or tourist season, etc. - makes it possible for groups of students to take part in the gathering of the seasonal crops and in business activities during the Christmas and New Year holidays. It can also be affirmed that the vacation period is necessary in countries where the climate is rigorous during the Summer.

3. There may be objections that the development stages of the child are being sacrificed in favor of economic interests (reduction of educational costs).

Evaluation

The reduction of the time a student spends in the system requires research on the evolutional development of children, on curriculum revision and on the redefinition of the objectives of basic education. It would also be advantageous to study the marginal yield at each level to consider any educational time reduction compatible with a minimum educational level.

On the other hand, this alternative could increase labor pressure by permitting secondary education students to work at an earlier age. The present trends of labor legislation regarding employment of minors should also be taken into account.

Finally, any reduction in the amount of vacation time for teachers, which has been discussed in detail in the section titled "Disadvantages", will cause policital, social and labor union implications.

Criterion: To increase the number of students per building

If the problem is a shortage of classrooms for an increased enrollment, the number of students per building could be increased up to 50% without reducing the space per student.

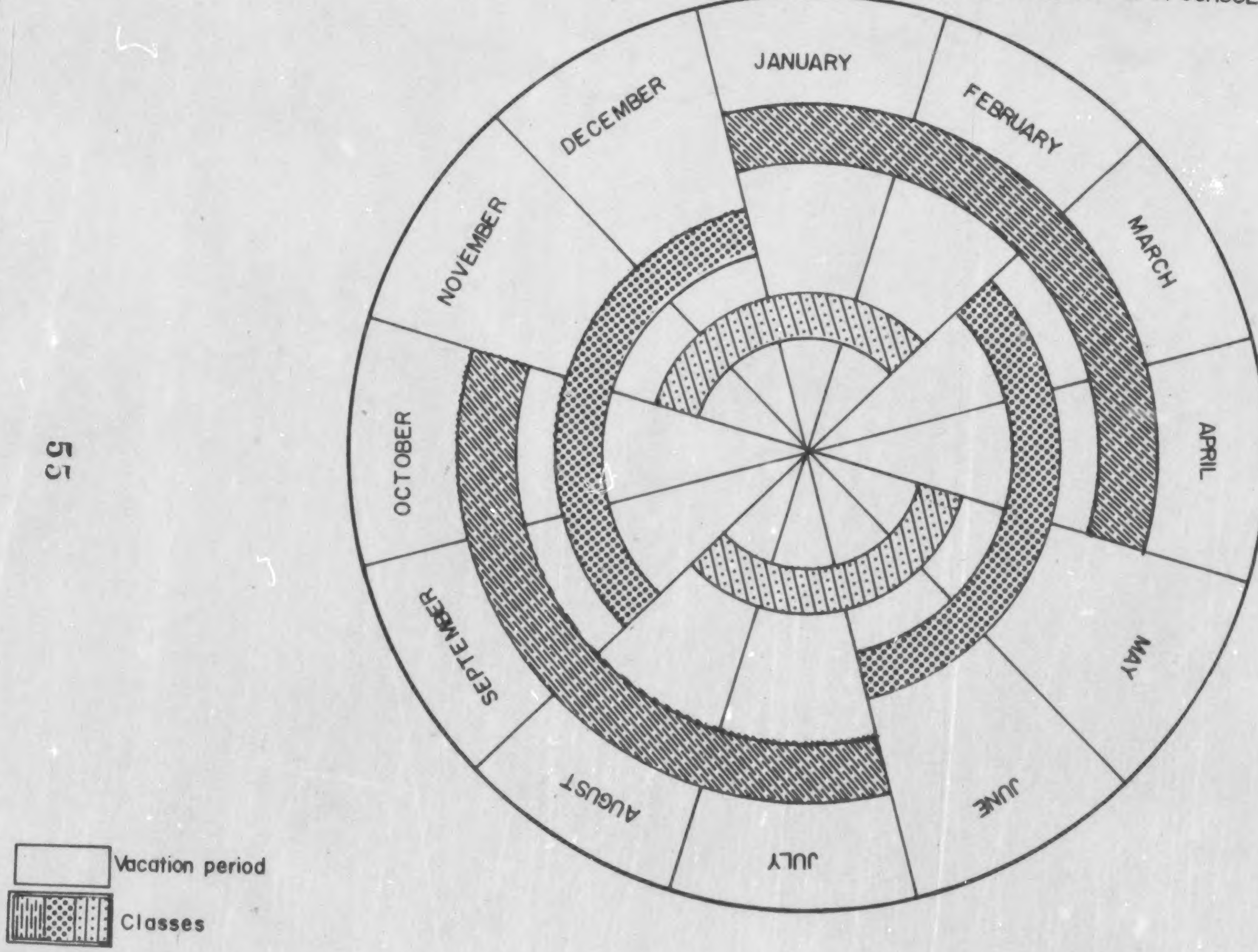
To do this it would be necessary to divide the school year into two four-month periods and intercalate the vacation periods of the teachers in two periods of two months each.

The dates to start the school year would also vary for each group within a 12-month year.

For example, this would permit a building having a capacity for 1,000 students on a double shift, to add 500 additional students if a night shift is initiated.

The following graph will help to explain the operation of this alternative:

MODEL OF CALENDAR SCHOOL YEAR TO INCREASE BY 50% THE CAPACITY OF A SCHOOL BUILDING


JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
Vacation period
Classes

Prepared by CEMIE / OAS

The preceding graph permits the following observations:

1. A group may attend morning classes during the months of January through April and have vacations in May and June; then, continue from July through October with vacations in November and December. In this way they will complete the two four-month periods of the school year and also their two vacation periods.

2. Another group may attend afternoon classes during the months of March, April, May and June and have vacations in July and August, continuing in the month of September to finish the second four-month period in December, with vacations in January and February of the next year.

3. A third group could start in the month of May and finish its first four-month period in August with first vacation period in September and October; then continue in the months of November, December, January and February to finish the school year and to have vacations during the months of March and April.

This group would work with a modified schedule as follows: During the months of May, June, November and December classes would be held in the mornings, taking advantage of the space left vacant by the recess of Group N° 1, and during the remaining school months classes would be held in the afternoons, using the space left vacant by the recess of Group N° 2.

The preceding organization permits three different groups to work in the same room, with an additional 50% installed capacity in the building.[*]

The reason why the use of the buildings is increased by 50% may be explained by the fact that if today there is an enrollment of 1,000 students during a nine-month period, with a three months recess, when enrolling 1,500 in the proposed reorganization, the total increase is 500 students which equals 50% of the 1,000 who were previously enrolled.

Effects on Teachers Costs/Students

If there is an easy flow of students from one time schedule to another, then it is possible that students may make up lost time in another schedule without having to repeat the school year. In this way the salaries budgeted for making up lost time would decrease.

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[*] This system permits the elimination of the night shift. The advantage of eliminating this shift may be clear in some communities frequently exposed to periods of violence and social unrest. The night centers are affected most.

Effects on building and Equipment Costs /Students

1. When the enrollment is increased, the utilization index of the building increases, producing a decrease in the total wastage of physical space.
2. The use of the building during 12 months increases the furniture and equipment utilization, which represents a lower cost per enrolled or graduated student, and furthermore decreases the amount of expenses intended for the purchase of such classroom items.

Effects on the Cost of Materials and Supplies/Students

Upon increasing the number of students a greater utilization of materials such as blackboards, globes, maps, dioramas, flannelgraphs, etc. can be obtained. This would signify reduced materials wastage per classroom unit.

If books are placed in a library, the cost will decrease in proportion to the greater number of students using them, if it is assumed that the wastage in this case is due to use and not to outdated texts.

Effects on Administration Costs/Students

If a greater number of persons has to be employed in services because of an increase in enrollment, the administration costs may increase, but, in any case, this cost will be much lower if compared to the advantages offered by other reductions obtained in the different inputs.

Other Advantages

1. The possibility of implementing better in-service training programs increases when teachers are distributed in three groups. More can be done for each group, which may result in better quality teaching.

2. The unit costs of the input "time spent by the student in the system" may decrease if dropout and repetition can be reduced by permitting students to enroll at different dates during the year, and also the possibility of having the students switch to another schedule if academic achievement is low and there is danger of flunking.

Evaluation and Duplications

In some states in Brazil (Bahía, Amazones, Rio de Janeiro and part of the State of Guanabara) in which this alternative has been implemented, favorable results have been obtained by successfully reducing the number of buildings needed and increasing school enrollment.

The modification shows better results when applied to medium or high density population areas rather than to rural zones.

However, it requires some organizationsl and curricular adjustments such as the following:

- An easy flow from one schedule to another in different periods during the year.
- Curricular uniformity in the three schedules.
- Uniformity of the evaluation systems.
- Training of the personnel for the application of the new system.

This system could not be implemented in Rio de Janeiro, capital of the Brazilian State of Guanabara, because of a teacher shortage. Some critics in Sao Paulo have questioned the main objective of the change if two groups were installed in the same building at the same time any way, since the new third group is practically the same as the group previously attending the night shift and neither the beginning dates for the school year nor the vacation periods of the teachers and the administration in general had to vary.

Now, this criticism loses effect if the night classes are maintained, since the increase in the utilization of the building refers to daytime groups. Obviously, when making a decision one must take into account the advantages and disadvantages of either eliminating or maintaining the night clases.

It has likewise been said that the building would require permanent maintenance, since it would be used throughout the year and it would not be possible to make repairs in the recess periods as is done at present. This could also cause administrative problems as was stated by the Sao Paulo critics.

Some Requirements for Implementation

1. Plan a satisfactory publicity campaign aimed at developing a positive attitude among teachers, students and the community.
2. Implement a pilot plan.
3. Adapt a vacation system compatible with the country's general administration in order to avoid problems with student vacations.

4. Adjust the vacation period of the students to the vacation period of the parents, or vice versa.

5. Place children of the same family in the same schedule.

6. Climate problems.

7. Statistical aspects such as:

   - Universal demand per school year and non-attended demands
   - Number of classrooms available and potential availability
   - Review of the student/teacher and student/classroom ratios
   - Legal and financial structures
   - Location of new schools (priority studies)
   - Possibilities of construction of new buildings and enlargement of the existing ones
   - New and replacement equipment

E. VOLUNTEER WORK OF STUDENTS AND OTHER PERSONS IN TEACHING ACTIVITIES

Description

Volunteer or non-remunerated work may be a way to reduce costs in education. Many educational activities can be developed by persons not on the payroll.

Some courses can be fully or partially covered by residents of the community. For example, an agricultural specialist could help out in some parts of a course in a vocational school; the manager of a corporation could help teach accounting. Mothers could help in grading objective examinations, office work, or in auxiliary teaching activities. The students themselves could do auxiliary work, either in an office or by teaching activities.

In some cases non-remunerated work can be done by foreigners working as volunteers. They can render valuable services at little cost for the host country. (The Peace Corps is an example.)

Another source for volunteer teachers is demostrated by the project being carried out in Venezuela on pre-school education.

This project organized in 1972 uses volunteers as auxiliaries of pre-school teachers. Volunteer work is done by mothers, students, employees and by all persons who, because of their educational preparation, aptitudes, abilities, and time possibilities, are able to help the teacher in pre-school education.

Cost Reduction Through Volunteer Work

Volunteer work can highly contribute to reduce educational costs. The following are some examples:

Teachers:

The qualified student/teacher ratio can be increased and the teaching personnel salaries decreased through the contribution made by volunteers. Volunteer work permits a qualified teacher to handle a greater number of students.

Buildings and Maintenance:

Volunteer work can reduce construction costs. Persons living in the community, students and persons in military service can help prepare the land up to a point where qualified labourers are required. In advanced stages of construction, the volunteers can work as helpers of the specialized workers.

In building maintenance work, volunteer cooperation can give better results since there is no need for a high degree of specialization.

Advantages

Besides the possibility of reducing costs in education, volunteer work is useful in that it brings the community closer to its schools.

In the case of foreign volunteers the advantages are the following:

1. The cost is relatively low for the host country.
2. Volunteers are more willing to work in rural areas, while nationals try to avoid it.
3. Volunteers are highly motivated, because they are generally altruistic individuals interested in good inter-cultural and international relations.

Persons in military service have the advantage of belonging to a disciplined and organized institution, and they can be required to work in rural schools.

Disadvantages

In general it can be affirmed that the disadvantage of volunteer work to reduce costs in education lies in the fact that their efforts could be more productive in other areas of national development.

The lack of skill in volunteers may cause poor efficiency in their work, therefore requiring supervision. Foreign volunteers specifically have the following disadvantages:

1. Volunteers have little teaching experience.
2. The length of time they stay in the host country is very short and a great part of their time is spent adapting themselves.
3. Foreigners have different values than those of the community where they are going to work. This may cause cultural conflicts.
4. Nationals may consider the presence of foreigners as part of an interventionist plan which threatens national sovereignty.

Implications/Evaluation

Volunteer work can achieve better results when it contributes to teaching programs based on radio, television, programmed training, etc.

If a class is given by radio or television, some of the mechanical tasks in the school (tuning in, tuning off, etc.) may be carried out by volunteers.

The alternative of engaging in a "semi-voluntary" type of activity such as teaching instead of military service might be proposed to the citizenry.

It can of course be argued that the effort of university level persons may be more productive in other national development activities.

It should be remembered that volunteer work contributes in reducing education costs, provided that the opportunity cost is zero or less than its contribution to education.

When a person devotes part of his time in collaborating with the school while he could be carrying out some other productive activity, his voluntary work would have a considerable opportunity cost.

F. REGIONAL COOPERATION

Description

It essentially consists in that several countries in a given geographical area implement specific educational projects cooperatively. The reason lies in that some programs may at times require technological development experimentation production processes, the costs of which are rather high.

A joint and centralized activity through regional cooperation may permit the implementation of projects at a lower cost per country. In some cases this might be the result of the possibility of creating a larger consumer market.

In this manual, reference will be made only to two types of projects as far as regional cooperation is concerned:

1. Preparation of textbooks and materials.
2. Construction of prefabricated classrooms.

Preparation of Textbooks and Other Materials

If the problem concerns textbooks and other educational materials, the main cost components -preparation, experimentation and publication which are quite expensive- could be reduced if projected towards a vast consumer market. Regional cooperation, in this case, would produce a centralized development of textbooks, thus minimizing unit costs.

It would also further a better utilization of human resources. Creative educators from several countries could join in a coordinated effort to write the books. For example, in the case of programmed teaching with materials which have a high cost, centralization for their development may be of much importance. There have been experiences in Latin America of regional cooperation of this type.

Let us take the case of textbook development for six Central American countries, implemented under the ODECA-ROCAP* program. It was carried out with qualified teachers from the countries that entered into the agreement (Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama). Texts were prepared, tested and distributed free of cost to primary schools in the countries mentioned. This program was started in 1963 in Guatemala (later moved to El Salvador), in order to make available basic books (Science , Social Studies, Reading, Language and Mathematics) to approximately 1,200,000 enrolled students.

When the regional program was terminated, each government assumed the responsibility of reviewing and reprinting the books according to their demand.

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* Organization of Central American States - Regional Organization for Central America and Panama of the Agency for International Development (AID).

At present, the signatory countries make periodical reviews to update the books and to adapt them to curricular changes. The publication is carried out in printing shops of the Ministries of Education or through bids among private companies. The books are distributed free to schools for the use of teachers and students. In this sense, some of the alternatives suggested in this manual, such as double shifts, consolidation, etc. may be used combined with a low-cost production and distribution book program.

Venezuela implements a regional program for textbooks but with different objectives. The Rural Training Center "El Mácaro", has produced several experimental textbooks in the last few years, but regional co-operation operates more in evaluative research and training of Latin American specialists.

Since 1967 Brazil has the "Fundação Nacional de Material Escolar-FENAME" (The National Foundation for Educational Material) with headquarters in the city of Rio de Janeiro, capital of the state of Guanabara from where the program is implemented on a national scale.

The reason to include Brazil's program within the regional cooperation alternative lies in the fact that we are dealing with a large federal country with autonomous states and where the consumer market is much larger than that of all the other small countries together. It is sufficient to compare the number of students enrolled in Central America (1,200,000) with those enrolled in Brazil (16,000,000).

This program, the origin of which dates back to 1956 when the National Teaching Material Campaign was organized, was reorganized as the " Fundação

Nacional de Material Escolar" (National Foundation for Educational Material) in 1967.

The foundation contracts qualified teachers to write textbooks. These are updated periodically by the same author who receives a salary for the preparation of the text and an extra sum for each revision. Only the Social Studies texts do not take the regional characteristics of the different states into account.

A total of 16 million individuals from primary and secondary educational levels (first and second grades in the Brazilian educational structure) are benefitted by this program.

The cost of the books is made up by the following four inputs: Production Costs, Indirect Costs, Financial Costs, and Commercial Costs. Distribution accounts for 12% of the Commercial Costs. The price per book page is estimated at $0.0023.

The program is thus self-financed and the foundation is in charge of all the work, except for the printing of the book which is done through bidding, by private firms. The firms which are traditionally successful in getting the bids are located in Rio de Janeiro and Sao Paulo, which are at the same time, the two largest distribution points for the country.

Rio de Janeiro has a sub-center in the city of Belén for distribution in the Amazon region. The price of the books is the same throughout the country. It is not affected by the respective distances.

Distribution of the books is handled through stands belonging to the foundation, private bookstores, mail deliveries, university stands, municipal offices and such government institutions as "Companhia Brasileira de Alimentos - COBAL (The Brazilian Food Company).

Other auxiliary materials such as guides encyclopedias, atlases, dictionaries in several languages, charts, slides and student materials such as pencils, notebooks, etc. are produced besides the textbooks.

It is worthwhile mentioning that many people besides students and teachers buy these books; and like students they usually form collections for permanent reference. The students do not change the books used in one grade for those of the next grade. Consequently the market is even larger than the one pointed out.

A chart shows the distribution of textbooks and teaching materials of the Brazilian program.

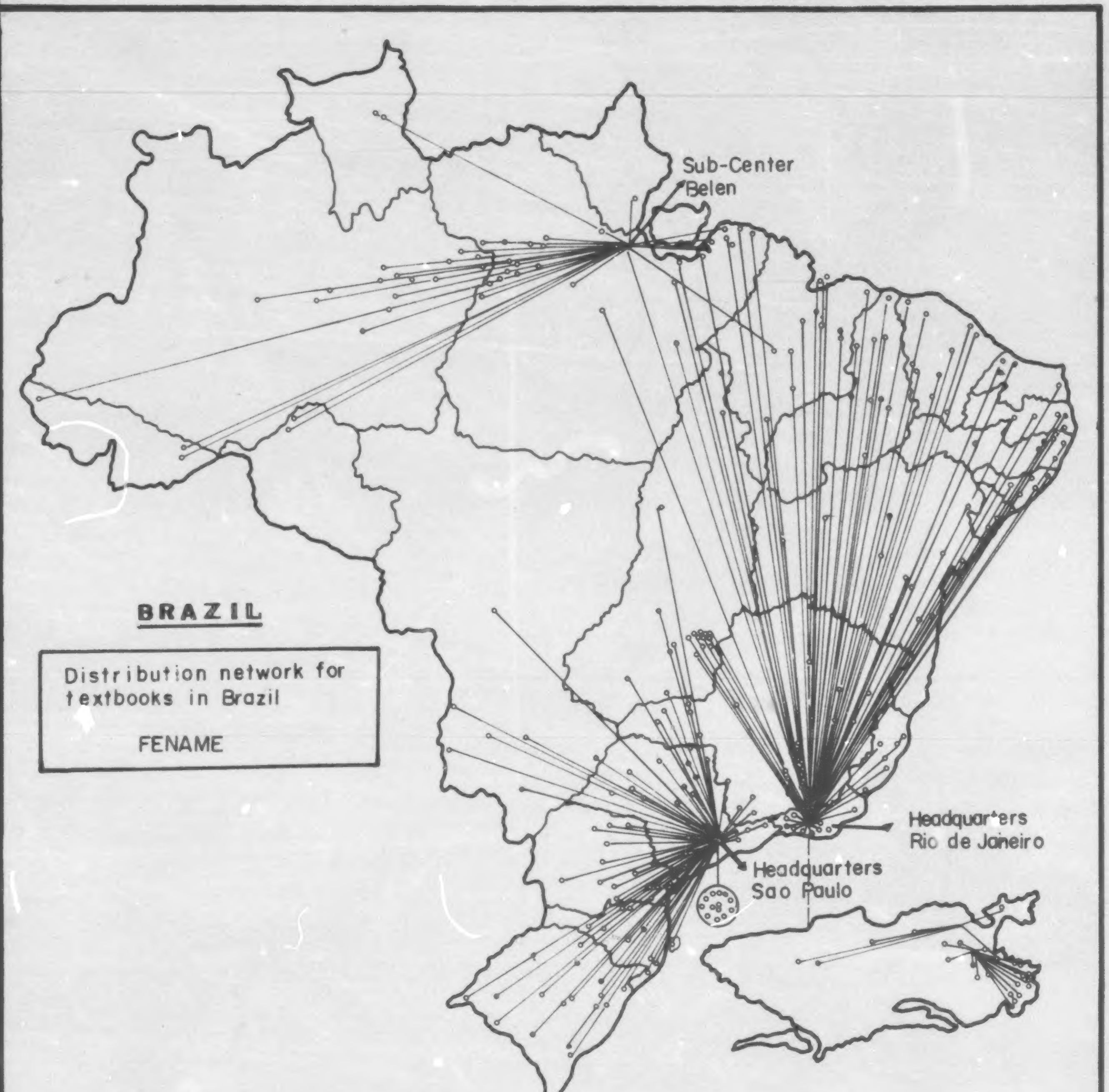
The two cases cited, ODECA-ROCAP and FENAME, represent clear examples of what can be accomplished through regional cooperation. One applies to several small countries and the other to several federated states in a big country. Other projects such as curricular evaluation, research, supervision and administration, etc., could also be included in regional cooperation programs.

Effects on the Cost of Materials and Supplies

If components such as development experimentation and evaluation, production and distribution are involved in the cost of textbooks and other educational materials, double shifts and consolidation can produce economies when more students use the books or because their distribution is less expensive.

It should be taken into account that climate and humidity damage the books. This means that a good grade of paper must be used and an

FIGURE 4


Sub-Center
Belen
BRAZIL
Distribution network for textbooks in Brazil
FENAME
Headquarters
Rio de Janeiro
Headquarters
Sao Paulo

adequate distribution system established in order that the books reach their destination in good condition so that they may last longer.

Many countries use newsprint to print their educational texts. At times, agreements are made to use pages of commercial newspapers to insert guidelines, instructions and other types of educational information. Besides using the radio, the Colombian SUTATENSA program sends different printed materials including newspapers to the students.

In many Latin American countries (Peru, Venezuela, Guatemala, Brazil, Colombia, etc.) government or privately owned newspapers are used to send educational information. This system has been applied in some places in literacy programs or to persons who, because of their extra-age, follow educational courses through which degrees equivalent to those of the formal educational system are obtained (adult or suppletory courses).

The cost price per textbook page to the National Foundation for Educational Materials (FENAME) in Brazil is around $0.0023, and consequantly 697-page books containing good material are available to the students at the price of $1.60 anywhere in the country.

In 1973, to publish an auxiliary pamphlet of the reading book "SOY FELIZ" (I AM HAPPY) Costa Rican educational authorities spent $0.0018 per page excluding development, experimentation and material distribution costs which are high.

Evaluation and Implications

One of the differences between the ODECA-ROCAP program for Central American countries and the program implemented by Brazil lies in that the

Central American project prepares and distributes the books free of charge to all educational centers, the national governments remaining in charge of updating and reprinting. In Brazil, the Foundation (FENAME) writes, edits and distributes the books through agencies, but the books are sold to students at their cost price.

Thus, in Brazil there are no government expenditures to supply each student with those books, because it is a self-financed program; and the contract with the authors insures the updating of their contents and their adjustment to the educational curriculum.

The criticism made of the Brazilian program by some planners points out that the expenses normally covered by the government to supply books and other materials to the schools are thereby deflected to the budget of the family sector.

The ODECA-ROCAP program has been criticised by Central American educators because they state that the books are not the appropriate ones, nor are they revised properly, which means a rapid wastage through lack of use because they become outdated or because they are not adjusted to the current curricula programs.

The above is corroborated by the following opinion expressed by one of the many Central American supervisors consulted through a case study conducted by the same program: "The greatest obstacle encountered in using the entire text is that there is no relation whatsoever between the contents of the books and the contents of the present curricular programs". From the time they were initially printed, the texts have not been revised in Costa Rica, and during the 1967-1973 period close to $1,000,000 have been spent in printing and reprinting. It is ignored whether the books have been revised in the other countries forming part of the agreement.

The revision of the books under this project is done by the advisers of the Ministry of Education. This generally occurs when changes take place in the programs. In Brazil revision is a permanent activity because it grants financial incentives to the author updating the book, if it is reprinted. In Brazil the books belong to the Foundation but the authors reserve the right to new editions.

Some effects on the textbooks

1. In the Central American program the books are printed for all students, but the frequency of use varies a lot depending on the area where the school is located (rural, semi-urban, or urban). According to an evaluation report made by the program itself, the books are used daily more often in rural areas than in the other areas, occasionally in the semi-urban areas, and in urban zones occassionally or never.
2. As far as the distribution of the books is concerned, the data obtained from a stratified sample covering 25% of the Central American educators shows that 58.2% stated that the number of books was insufficient, 89.9% stated that they had not arrived at the beginning of the school year, 41.8% stated that they had not been reprinted, 59.5% said that they did not arrive in the proper sequence and 41.8% reports the lack of instructions and guidance. This data clearly reveals the problems related to the distribution system.

In the Brazilian programs this situation cannot arise because the students buy their books at different points of distribution throughout the country.

3. In Rio de Janeiro it was reported that there is some resistance from secondary teachers to the introduction of official textbooks. This occurs because many of them write their own texts which are published privately. In this manner they earn extra income.

4. It was also reported that there are pressures from publishing houses to discontinue the production of official educational texts. It seems that the large book distribution centers in the cities complain because the sales of other books have dropped due to the fact that the students prefer the official texts, which are also cheaper.

5. The distribution of books in Guatemala encountered many difficulties due to lack of government transportation facilities. Many books only reached the regional educational supervisors and not the schools. It has already been mentioned that 89.9% of the Central American supervisors reported that the books had not arrived at the beginning of the school year.

2. Regional Cooperation in the Construction of Prefabricated Educational Classrooms

With regard to classroom construction, only by standarizing the components can mass production achieve much lower costs than those of local production, because even in small localities groups may be formed to make purchases and thus obtain building materials at large discounts.

In Latin America, there are practically no experiences with regional cooperation in the construction of educational classrooms. There are examples of a country obtaining from another country, with a more advance technology, prefabricated classrooms in order to lower costs.

In Costa Rica, for example, prefabricated classrooms for use in primary and secondary education are at present being imported from Mexico. Shortage of capital resources forces the government to use bonds as a source for financing. Unfortunately, it seems they have been unable to obtain a reduction in costs, due to the interest rates and transportation costs.

Another similar case is that of Brazil, a large country with individually operated state funds, which has tried to bring about a reduction in the cost of classroom construction. In the State of Sao Paulo, classrooms prefabricated locally are used in various parts of the country, in marginal areas or in rural zones. Once those classrooms located in the marginal areas have accomplished their purpose, they are taken apart to be transferred to other locations or areas, where climatic conditions do not permit construction throughout the year.

In any case, we are dealing with standardized production of all parts of a structure which is the same for the various locations. However, when these units are utilized, the people of the community should help in preparing the site and cooperate in the installation.

Effects on Building Costs

According to reports from the State Fund for Educational Buildings

(FECE) of the State of Sao Paulo in Brazil, a prefabricated classroom costs 50% less than one built by the regular method.

The repair costs may be lower, since it is possible to purchase standardized parts mass produced through prefabrication, at a lower cost. In this case, economies of scale obtained through this system of production accrue to the benefit of the consumers.

Prefabricated classrooms imported by a developing country may result more expensive due to transportation expenses and because interest rates must be paid when purchases are made on credit.

If the same company is contracted to construct a standard design of all parts, there will undoubtedly be some economies of scale which could be accrued to the institution financing the school.

Implications

Some architects have expressed the opinion that

1. If many countries now building their classrooms with local materials (block, brick, etc.) should decide to import prefabricated classrooms, they might drain foreign currency holdings by importing steel.
2. Others have expressed their opinion stating that imported prefabricated classrooms often have designs which are outdated and that they are purchased only because of the credit facilities granted due to shortage of local capital resources.

G. USE OF LOWER COST FACTORS

Description

Consists in rationalization of public expenditure by using lower cost factors of elements in educational projects for large scale production of materials.

This alternative can be found in two cases:

1. In the production of textbooks and
2. In the construction of classrooms.

1. Textbook Production

One of the highest costs in the production of books is paper. This cost is reduced in some countries by using "newsprint" as supplements to local newspapers instead of textbooks..

In Colombia, Venezuela and Guatemala, for instance, the additional courses on community development and agricultural techniques are partially conducted by using weekly newspapers which are distributed among the farmers. In Peru and in other countries, educational materials are printed, at times, on pages added to newspapers.

On the other hand, if distribution costs are high, as occurs in many countries, it may be preferable to use higher quality paper in order that the books last longer. In Brazil, for example, the National Foundation for Educational Material (FENAME) produces textbooks at the cost of $0.0023 per page with a material which permits their use for several years.

In the near future it will be technologically possible to use semi-plasticized paper in the manufacture of books, thus extending their life-span from five to ten years and consequently reducing the costs a little. However, one disadvantage long lasting books might have is that they could become outdated or obsolete before deteriorating through daily use. Nowdays, when rapid scientific and technological advancements take place and Latin American countries constantly revise their educational projects and programs, the production of textbooks with expensive materials to extend their life-span may be the wrong step to take.

In any case, it seems an advisable measure to send the educational information or programs desired through Ministry-owned or State-owned newspapers or through local daily papers.

Influence on Other Costs

It might be possible to organize some in-service training programs by using lower cost factors such as newspapers. In this manner the training expenditures can be reduced. In Peru for example, newspapers are used in the technical training of supervisors.

Effects on Building Costs

Many schools have a special place to keep books. This alternative would make it possible to make better use of the space, since the materials would not have to be deposited at the school. It should be remembered that books are damaged by climate and humidity, therefore other economies could be obtained if newspapers are used instead of books.

Implications

1. Some pedagogical problems could arise if the information in newspapers lacks sequence or relation to each phase of the educational process.
2. Students and teachers might also limit their attention to newspapers and not other sources and thus be satisfied with the information received.
3. If commercial newspapers are used it could be argued that the costs of books or training which are traditionally covered by the government are being deflected to the family budget.

Example of a real case

A newspaper company has its own printing equipment and a system of distribution which reaches all corners of the country.

If through an agreement with the company, a Ministry of Education should succeed in publishing educational texts in newspapers, the costs would decrease considerably each week. The newspaper would publish an educational supplement containing teaching materials.

In a Latin American country* a first grade text was recently published with an edition of 100,000 copies. The printing cost was $10,814.

In that same country, the newspaper with the largest circulation publishes 100,000 copies daily, and charges $140 dollar per page.

If we take into account that on one page of a tabloid size newspaper, two pages of the same size of those of the first grade text mentioned would fit, the whole pamphlet would require 30 pages of the newspaper (60/2) and the price would be $4,200 (140 x 30). This means that in the first case the 100,000 books cost $10,814 and in the second case the same book cost $4,200, resulting in a reduction of $6.614 (10,814)-4,200), representing a 61% saving.

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* These are true figures pertaining to a Latin American country.

Furthermore it is important to note that the $10,814 cost of the mentioned publication refers only to printing costs; while the payment to the newspaper also includes distribution as the supplements would be distributed together with the newspaper. In other words, the savings would be much more than 61%.

2. Classroom Construction

The investments to build schools have been growing during recent years in Latin America. This situation has brought about the need to achieve better utilization of space, and consequently different types of administrative organization have been used to avoid wastage. On the other hand, those designing the buildings have been conducting studies on modular construction in order to achieve optimum utilization of space.

In some countries the space per student has been reduced due to lack of classrooms. In Venezuela, from 1 to 120 meters are used per student in pure classroom space. In Colombia the average is 1.20 meters per student, while in Costa Rica the figure varies: in the city there are cases of 0.80 meters as well as 2.50 meters per student, the average being 1.40. This problem apparently does not exist in rural areas. In Peru, the school has different uses besides educational activities. In Brazil there are schools in use by different groups up to 16 hours a day.

All the countries have different norms governing space per student as compared to those set forth by international organizations such as CONESCAL (Educational Buildings for Latin America) which has pointed out some optimum norms. Circumstances have forced planners to take steps to try to succeed in complying with enrollment demands.

The location of schools is important, because if they are too isolated there will be less probability that the students will attend. The utilization indexes may be improved if some buildings are shared with the community; for example, libraries and auditoriums may be used by both. Schools can also be used for other purposes during vacation periods (teacher training, for example) and during afternoons and evenings (adult education). In almost all countries at present, the schools are used by non-school groups. In Peru the school is the center for all activities carried out in a community (training of farmers in agricultural techniques, literacy programs, social work, etc.). In the rural areas of Latin American countries schools are used for several extra-academic activities.

For several years cost limits for space per student have been established in the new schools of some developed countries. Besides that, work specifications were pointed out, for example, in terms of minimum light intensity which permits them to comply with the specifications in various ways without restricting the school to, for example, square feet of window space.

Productivity in the building industry is partially determined by the opportunities to standardize the parts and by mass production. The inputs for the building of schools are mainly land, non-skilled labor, skilled labor, mechanical equipment and materials.

The possibilities of replacing low cost inputs by others of high cost, and the possibilities of increasing productivity in the building industry, without overlooking the problems caused by different climatic conditions in the standardization of parts will be demonstrated in some detail as follows:

Hardly anything can be done to reduce the price of land where a school is to be built, nor to lower interest rates. The latter is usually determined externally and not in consultation with educators; consequently none of these two aspects will be referred to at present.

There are many ways to replace already fabricated high cost products with cheap materials produced locally. However, the use of low cost materials may result in false savings, if later on high maintenance and repair costs should result. One of the reasons to use cement floors and corrugated sheet metal roofs is that less maintenance is required.

Local materials are also used in other ways. In Costa Rica, old military forts have been converted into secondary schools or museums.

Volunteer or non-skilled labor may often be used as a partial substitute for skilled and contracted labor. In many Latin American countries community residents donate the land, prepare it and supply local materials before contracting skilled personnel for the construction task.

This happens frequently in Central America, both in the rural areas as well as in semi-urban locations.

Around 1958, the "tri-party" project to construct schools was started in Guatemala. It consisted in combining efforts of the central and municipal governments, the community and foreign aid. Generally the community receiving the benefits supplies the land, some materials, transportation and volunteer work. The central government and the municipalities pay the salaries of the skilled personnel, the construction plans and the supervision, while the foreign aid is used to purchase some of the materials, such as sheet metal, floors, etc.

School furniture is also produced in Guatemala, with aid from different entities through a campaign called "Operación Pupitre" (Operation Desks). This consists in the construction of the furniture needed in schools by government workshops. In this case the communities supply the wood and at times military personnel and equipment is used to distribute the furniture. Some schools also receive volunteer help from military personnel (soldiers) for maintenance and the national or regional government supplies the materials used.

The use of prefabricated classrooms is a good idea where climatic conditions do not permit regular construction. However, in general, the prefabricated units are very expensive for developing countries. The high costs for materials and transportation could perhaps be compared with the high costs of skilled labor which would be required in regular construction. If prefabricated units are used, community residents should do all the work involved in preparing the land.

If the same building company is contracted to construct a uniform design of all the parts, it would undoubtedly obtain large economies of scale which could be transferred to the institution financing the school.

There are two examples of the production of prefabricated classrooms in Latin America. Mexico exports prefabricated classrooms to Costa Rica. There is not much information available concerning this project although it seems that these classrooms are not being used in Mexico. The other case is Brazil, where they are used not only in places where the climate does not permit regular construction, but in marginal areas where they are disassembled, once their mission has been accomplished. There is also a project of a British company to install prefabricated classrooms to meet the demand for expansion of initial, pre-school or kindergarten education. This aspect will be referred to in another section of this manual.

In Argentina, parts of the classrooms prefabricated in the country are used in regions where the climate does not permit regular construction.

Effects on Cost: Buildings and Maintenance

1. The volunteer aid of the communities in the construction of buildings, furniture, transportation, or of military personnel in maintenance and transportation, reduce the construction costs considerably. However, it should not be forgotten that such aids possibly have an opportunity cost. In the case of the community members, they will be forced to postpone some tasks in order to devote time to volunteer work, and in the case of military personnel it would mean the deflecting of some expenses of the Ministry of Education to some other Government Ministry. In the first case, if the opportunity cost is low, then it can indeed be considered as a

good aid because on the contrary it would be a deflection of the cost usually covered by the central government.

2. In the case of prefabricated classrooms, the information supplied by the State Fund for Educational Buildings of Sao Paulo, Brazil shows the advantages of classroom prefabrication, since it reduces costs up to 50%.

Disadvantages

1. One of the disadvantages of using non-skilled labor (volunteers) consists in that many times the work does not meet the construction requirements, or the materials supplied are of a poor quality, thus requiring more maintenance.

2. Another disadvantage is found in zones where there are no roads. Prefabricated classrooms can not be easily transported to these locations by the government. So a company must be contracted with the necessary equipment to do it; thus resulting more expensive. In Argentina there are cases where a company has had to build a school of this type because neither the government nor the community were able to do it. In these cases it might be preferable to erect a building with regular material even though climatic conditions are unfavorable.

Evaluation and Implications

1. A regional cooperation policy is recommendable for the construction of prefabricated classrooms. This policy will undoubtedly mean advantages for the participating countries. When classrooms are imported, it might occur that they can not be adjusted

to the educational requirements, that interest will have to be paid on the capital when purchased on credit, and transportation expenses might be excessive, representing higher costs.

2. One comment made by architects on the importation of prefabricated classrooms consists in that it represents an import of steel and that the country's foreign currencies are thereby drained.

H. RADIO AND TELEVISION

General Explanations

The use of radio and television in education has been increasing in several countries. Generally the use of the radio preceded the use of television. Around 1920, educational radio was widely used in the United States, but with the appearance of TV its use has decreased in that country. There are several experiences in radio schools in Colombia, Mexico, El Salvador, etc.

Since the middle of the 1951-1960 decade, Latin American countries started to organize televised educational programs with different scopes and characteristics. Colombia introduced some televised educational programs in 1955, Venezuela in 1958, Chile in 1959, Brazil in 1960, Peru in 1962, Uruguay in 1964, Argentina in 1966, Mexico in 1967, and El Salvador in 1969.

The use of these teaching instruments has been furthered by the need of extending educational opportunities offering high quality education at low cost.

Low density population areas and/or distant from the urban centers are almost always the most backward and the ones needing the greatest educational efforts; but these areas require so many material and human resources that the traditional methods of direct teaching of only one grade by only one teacher can not be universalized under the present circumstances and limitations.

In several Latin American countries radio and television has different educational uses.

Colombia, for example, offers a highschool degree by radio through the Popular Training Program of the Secretariat of the Presidency of the Republic; television is established in primary teleschools as a complement to the teacher, and a fifteen-minute course is offered daily for this purpose. A private institution -Sutatensa- has a primary level radio program whereby students are offered a study program equivalent to that of the regular system.

In Venezuela, television is used in vacation periods for remedial courses for students who have failed subjects, thus helping them not to fail the school year.

In Peru television is used in primary education and in some courses for secondary education students who because they are over age are working within the Peruvian educational system. In this case, such instruments are complementary to the teachers' role; however, it seems that there is an agreement pending with a French institution to improve television in order to implement programs which will take the place of the teacher in locations where they are needed.

In Argentina, educational television is used for cultural and scientific informational programs throughout the country, but at present studies are being conducted to seek other uses for this technological innovation.

In Brazil there are several uses both for television as well as for radio. Sometimes they are used in programs for regular students and at other times for overage students who receive the courses from television or radio sets installed in schools, factories, companies, municipal offices, etc. In the state of Marañón there is a televised program which practically replaces the teacher. In this State, teacher shortages and distances, have made it necessary to have televised programs for certain grades of secondary education in which the teacher does not remain at the school, and he handles a number of students greater than that of the traditional system. This program has not been observed nor are documents on it available; only this information was obtained. It seems that since it has only been operating for a few years (2 or 3) it has not yet been evaluated.

It is worthwhile underlining that many countries do not have educational television stations; the Ministries of Education prepare the programs and they are shown on private television stations in accordance with agreements. On the other hand, there are countries which have governmental television stations and which also prepare the programs. Rio de Janeiro, for example, does not have a government station but they prepare the programs; while in Colombia there is a government station and they also prepare the programs.

Educational radio and television costs can be classified as follows:

a) Production costs (programming, administration, management, etc.)

b) Distribution costs (transmission)

c) Reception costs (purchase of receivers, maintenance, etc.)

Each of these categories has fixed (or capital) and variable (operating) costs.

Fixed production costs are those which to a certain extent remain relatively constant independently from the number of students attended and the number of programming hours. For example, if it is considered that the maximem transmission time of a television system is 24 hours daily, a demand of over 24 hours would require a second channel and thus the fixed costs will increase.

The variable production costs vary according to the number of program hours. However, on the basis of student/hour, these costs vary proportionally to the number of students who see or listen to the program.

The fixed transmission costs are due to the towers, special equipment and buildings for the television station. The operating costs vary according to the number of transmission hours.

The fixed reception costs are expenditures attributable to the purchase of receivers, electricity installations, personnel training for equipment operation, and rearrangement of classrooms.

The variable reception costs are payment of electric power, purchase of batteries and repair expenses.

The student/hour reception cost decreases as the number of transmission hours increases. Production and transmission costs decrease as the number of participating students increases.

Cost Components Affected by Radio or Television

Teachers:

Through the use of radio and television it is possible to increase the size of the classrooms and, consequently increase the student/teacher ratio. However, it should be taken into account that radio and television can only be used for large groups if large classrooms are available. Otherwise, the increase in size of the classrooms (increase of student/teacher ratio) required by the use of radio or television would depend on the expensive construction of large classrooms.

Materials and Supplies:

Since developing countries often experience textbooks shortages, it does not seem very possible that electronic media will be introduced in education, since the use of these media would demand an even larger investment in complementary textbooks, pamphlets or notebooks. Use of radio and television permit indirect savings in textbooks, since it is to be expected that they will reduce the dropout rates, consequently there will be less student concentration in the lower grades; that is, fewer textbooks will be required.

To a certain extent it may be possible to have radio or television replace books and materials. In this case there would be a revision of the quantity of materials and supplies needed and the expenditures for books would be decreased. However, a large part of the research emphasizes that optimum use of these media requires considerable expenditures for textbooks and workbooks.

Advantages

Radio and television facilitate a high quality rapid development of the educational sector in countries where there are extreme shortages of well trained teachers. Furthermore, radio and television enable rural students to have equal educational opportunities. Generally, rural schools are not able to attract well trained teachers and therefore they cannot offer specialized courses.

Expenditures for salaries of the teaching personnel can be reduced if the students/teacher ratio is increased in classrooms having television.

Radio and television encourage specialization. The main function of a monitor may be maintenance of discipline, while the instructor has the responsibility for teaching, either through radio or television.

One of the greatest advantages of radio and television is that the fixed costs can be distributed in a varied number of uses. For example, radio used for primary lessons may also serve for adult education, in-service teacher training, teacher improvement courses, lectures on agricultural techniques, etc.

Disadvantages

Perhaps the greatest disadvantage of radio or television in developing countries is that there is no adequate infrastructure to support the technology required by these communication media. Therefore, it is probable that the country will have to make large investments to implement the programs.

Administration and operating problems could arise in the system once in operation: irregular supply of electricity, frequent interruptions, obstructions in reception, late arrival of work guides, lack of maintenance mechanisms, etc.

Evaluation and Implications

Obviously, radio and television contribute very little to minimize unit costs in education, if they are only used to complement the teacher and not to replace him. In El Salvador some studies have pointed out that the regular teacher watches the televised programs together with the students. However, even this bad practice reduces the rates of educational losses, especially those due to repetition or to failing which generate dropout.

In terms of student utilization it seems that there are no significant differences between the use of television -with or without a trained teacher present in the same classroom- and traditional teaching methods under a well trained teacher.

There is some evidence that students with less than normal aptitudes obtain better results by using television.

In some studies it has also been proven that there are no significant differences between the use of radio and television and a well trained teacher. Some authors maintain that it is not the method, but the time the student is exposed to the method, that determines effective learning.

In developing countries in general, there is a great shortage of well trained teachers. In this case, television or radio may serve to improve the quality of education received by the students, thus causing a lower rate of educational losses and a more expedient learning process.

The largest quality improvements are observed in rural areas, which often have difficulties in attracting high quality teachers. On the other hand, if students from the rural areas were offered educational oportunities similar to those received by students from urban areas, rural families could be stimulated to remain in the rural areas instead of emigrating to the cities. The new media (radio and television) can not fully replace the teacher. At least one semi-trained monitor will be required to maintain discipline and to control the receiver.

Efficient use of radio and television requires: a) a well developed infrastructure for electricity production and transmission; b) a team of highly qualified technicians and repair personnel, and c) educational buildings easily adaptable to the use of these media. The resource requirements are considerably higher in television than in radio. Radios are less complicated to repair; they can operate on batteries and do not require major alternations in buildings.

Television, however, requires a uniform flow of electricity. This factor alone can determine whether television is feasible in a specific country.

Televised education has been possible in El Salvador because the country has a national power source which supplies uninterrupted electric power throughout the country. Other countries may have the problem of frequent interruptions and, in this case, the teacher is never sure of receiving the transmission on time. And what is even more serious is that in some countries the rural schools do not even have electric service.

The feasibility of televised education is also determined by the condition of the communication network and especially by the percentage of the population with receivers to view the programs.

Colombia, for example, has an 80% television coverage. In this case, the additional costs to transmit educational programs are relatively low, but the reception costs are still high.

If the communication network is not well developed, a considerable investment will be required before television can become feasible.

It is also worthwhile to evaluate the teaching costs, through radio or television, in terms of a critical point at which the unit costs when using these methods, are equal to the unit costs of traditional methods, whether using well trained teachers or those existing in a given country at the moment. This critical point will obviously vary and it will depend on many factors:

a) quality and cost of the teacher used in association with radio or television;

b) the level at which the cost per student is referred to (enrolled or passing student).

Costs will be at their lowest point when low-cost monitors are used with the media, and the measurement of the result is a graduated student (for example, a primary school graduate).

In El Salvador, the critical point for televised education has been estimated at 1,000 class groups watching the same program at the same time.

Little research has been conducted on the advantages of learning through radio compared to televised education. It is reasonable to expect that television is more effective than radio, especially for subjects requiring visual demonstration. However, even the use of the radio will serve to improve educational quality in many countries, and since the costs per student-hour are so low (one cent of the dollar in some countries), radio offers excellent opportunities to reduce educational unit costs.

There are obviously few possibilities of reducing educational unit costs if radio or T.V. are used only as complements of the present resources and not as substitutes.

Many countries will probably discover that it is more effective to use a combination of radio, television and other instruments of modern educational technology. Some subjects may be taught using radio and others using television. Since radio is much cheaper than T.V., developing countries should try to establish educational radio networks before making large investments in televised education. The use of the radio will allow countries to gain valuable experience in the administration of "long distance" teaching.

It might be advantageous to briefly refer to some teaching experiences in radio and television. Even though there have been many projects carried out in Latin America, three examples from Mexico have been chosen:

1. The Tarahumara Radio Schools,
2. The Primary Radio in San Luis Potosí, and
3. The "Telesecondary".

1. The Tarahumara Radio Schools

The "Sierra Tarahumara" (Chihuahua) is a remote region of rural Mexico which is characterized by a greatly scattered population

(125,000 inhabitants in 40,000 square kilometers) and by a high percentage (40%) of indigenous population

In spite of the adverse conditions for agriculture, this activity is precisely the main source of employment for the inhabitants.

The idea to offer formal education to the school-age population through the radio was first considered in 1955.

In 1957 the Tarahumara Radio School obtained authorization to offer the two first primary school grades.

The radioschool has a radio station. The classroom radios are tuned in only to the frequency of the transmitter.

Two teachers teach all the lessons for 1,081 students (in 1971) distributed in 46 schools. Each school has two "auxiliary teachers". These teachers have only had a primary education. They organize the groups and supervise the work of the students. The auxiliaries receive special training for this work.

In general, the students of all grades are in the same classroom. Each subject is taught for 60 minutes, 15 of which are devoted to each grades. While one grade listens to its 15-minute program, the other grades do individual excercises.

Some schools have room and board from Monday through Friday, thus avoiding absenteeism caused by the great distances the scattered students must travel from their homes to the school.

The Sierra Tarahumara radioschools represent an effort to offer educational opportunities in a complex rural area. Obviously, a system like this one will have to face many social, financial, administrative and pedagogical problems, etc.

One problem reported is the high dropout rate between grades and the small number of students who continue their studies beyond fourth grade (which is the level of education offered by radio). This makes an economist conclude that the costs of this kind of education are very high. However, it is an experience that could well be examined as an alternative for offering low cost education, especially in isolated areas.

2. The Primary Radio of San Luis Potosí

This experiment has been implemented as another alternative for primary education in rural areas.

The Primary Radio was started in 1969 as a pilot project and its first classes were broadcasted during the 1970 school year.

A school operating under the primary radio system offers the primary school grades with only four teachers. Three teachers handle the first three grades (one teacher per grade) in the traditional method and without using the radio; one teacher handles the fourth, fifth and sixth grades in one classroom and uses radio lessons.

In this case, the reinforcement of the teacher's task through the radio permits expansion of educational services. Please note that the radio complements and does not replace the teacher. In financial terms, the savings refer to the low cost of the primary radio as compared to the yearly salary for two teachers, which is the saving obtained in this system.

The subject matter chosen to be taught through the radio is classified as "regular" or "specific". The regular subject matter is that which can be understood by the three grades. The specific subject matter is directed towards one grade in particular. When a grade listens to specific subject matter, the other two grades use their time in doing exercises.

The use of the radio is aimed at increasing teacher efficiency, since complete primary schooling can be offered by only four teachers.

In a comparative study on costs conducted in 1972, it was determined that for an enrollment of 2,800 students, the cost per student in Primary Radio was $52.60 and according to an estimate, if the same students would have received lessons in the traditional manner, the cost would have increased to $118.

The following table shows the comparisons:

TABLE 5

COMPARISON OF THE COST PER STUDENT IN EACH COMPONENT ACCORDING TO TEACHING METHOD
(In dollars)

MEXICAN PRIMARY RADIO-1972

Component	Direct Teaching	Primary Radio
Teachers (salaries)	$ 96.00	$ 32.00
Furniture	22.00	7.00
Radio production	...	12.16
Radio distribution	...	1.36
Radio reception	...	0.08
TOTAL	$ 118.00	$ 52.60

3. "Telesecondary"

This program offers secondary education (seventh, eight and ninth grades) to students who would normally not be able to continue their studies after concluding primary schooling.

The telesecondary started in 1966 as an experimental school for 83 seventh grade students divided into four groups. Three groups attended TV classes and were assisted by regular teachers and one group received only TV classes. The experiment was considered a success and in 1967 more than 300 television classrooms were installed in 8 states, to handle about 6,500 seventh grade students.

Normally, the students receive 33 televised lessons weekly. The television classes last twenty minutes. Thus, in one hour each grade receives its television class.

A study conducted in 1972 reveled that the cost per student in telesecondary was $151. If the students would have received the classes in the traditional method (direct teaching), the cost would have been $200 per student.

TABLE 6

COMPARISON OF ANNUAL COSTS PER STUDENT (In Dollars) ACCORDING TO TEACHING METHODS AND COST COMPONENTS

MEXICAN TELESECONDARY -1972

Component	Direct Teaching	Tele-Secondary
Administration	$ 50.00	$ 6.00
Teacher's salary	94.00	88.00
Furniture	28.00	11.00
Materials .	28.00	20.00
TV production	...	19.00
TV distribution	...	2.00
TV reception	...	5.00
T O T A L	$ 200.00	$151.00

I. PROGRAMMED TEACHING

Description

Programmed teaching is theoretically based on the work of B.F, Skinner. It consists essentially of a learning process based on small steps which require the student to actively respond. Furthermore it supplies the student immediate information or feedback on the correctness of his responses.

The following are the characteristics of programmed teaching:

- The student is an active participant in the process;
- The learning progress rate is adapted to the student's needs;
- The student receives information on the correctness of his answers immediately and continuously.

Lowered Costs

According to some teachers, programmed teaching permits better and faster learning. Some studies conducted in developed countries have proven that this instrument reduces educational losses and permits the teacher to handle more students.

Advantages

The principal advantage of programmed education consists in that it allows the student to work in accordance with his own abilities and time requirements, since the educational materials are highly structured and organized. Programmed teaching permits the use of volunteers in some auxiliary activities.

Since the students work individually, the possibility exists that fewer textbooks per grade will be needed.

Disadvantages

As the student progresses at his own pace, the teacher may have difficulties in some coordination functions.

In countries were books are published with difficulty, the production of programmed materials will, of course, show high costs.

Furthermore, the acceptance of programmed materials may be difficult in the Latin American countries, where the figure of the teacher has been traditionally perceived as that of mentor directing the whole learning process.

Evaluation/Implications

Developing countries have very little experience in programmed training. However, developed countries have conducted considerable research on the efficiency and effectiveness of these instruments. For example, the Educational Research Service discovered that the use of programmed education permitted dropouts to be reincorporated in the schools, to improve their scholastic achievement and reduced repetition to zero in the State of Michigan (50% repetition was found in a control group).

There is evidence that programmed education is more effective for persons with slow learning ability. On the other hand, research carried out in the United States suggests that students consider programmed education boresome.

If educational unit costs are to be reduced, programmed education should not be used as a simple complement of the conventional method, since it would only be an aggregate, and to a certain extent an expensive one. Programmed education should replace the teacher.

The processing and development of programmed education materials require highly specialized educators, but publishing and distributing these materials does not imply more resources than the ones needed to produce and distribute ordinary textbooks. Obviously, developing countries that do not have adequate mechanisms for the production and distribution of textbooks will require an additional investment to introduce programmed education..

The costs of programmed education are to a great extent the salaries and administrative expenses related to the processing and development of materials and to the production and distribution costs of these materials. As was said before, these latter costs do not necessarily differ from the expenses related to the printing and distribution of conventional texts.

In countries where costs are high it might be more advantageous to produce textbooks with resistant materials (for example, semi-plasticized paper).

In summary, programmed education seems to be an effective method and permits cost savings; it permits mainly a higher students/teacher ratio and may offer possibilities to replace well trained teachers with auxiliary teachers.

Programmed education materials are difficult to produce and require highly trained persons in that respect.

Certain subjects such as science and mathematics can be notably adaptable to programmed education techniques. This allows the quality to be improved and the costs to be reduced in such important disciplines.

J. REDUCTION OF TEACHER WASTAGE

The formation of teachers is an expensive activity, since teachers leaving the profession represent a considerable wastage of the allocated funds. Studies conducted in developing countries point out that many teachers, especially men, abandon their profession attracted by better paying jobs and by more prestigious jobs.

In the Bogota (Colombia) district, for example, it is estimated that 75% of the in-service teachers are themselves studying at a higher level. However, only 18% of them are persuing courses related to education; the rest are considered potential dropouts. In Brazil, 60% of the graduated teachers are working outside the teaching profession and at present only about 220,000 graduated teachers are actually working.

In Costa Rica, in 1972, according to a study conducted by CEMIE/OAS* there were 633 teachers working at the primary level without a teaching degree, but there were about 1,000 education graduates not working in teaching activities.

The percentage of dropouts who return to the teaching profession is very low. There is a greater dropout rate among women than men, but their return to the profession occurs more frequently. This is due to the fact that women often abandon work to attend to their young children; but they return to their profession once their children have grown.

The dropout problem is very serious in rural areas. Teaching in urban areas is better paid and offers greater attractions, consequently, teachers tend to migrate to the cities. One way to decrease rural teachers dropout would be to give them opportunities to meet with other collegues from the urban areas. In Colombia, for example, the salary structure clearly favors the urban sector. This is so because the educational budget is prepared at three levels: national, departmental and municipal levels, and the latter usually has fewer resources available.

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* Nature and Factors of Employment and Unemployment of Teachers. 1972. CEMIE/OAS, 1972.

There are few solutions to the problem of teacher dropout. Obviously, higher salaries would reduce the number of dropouts, especially men; but this could be more expensive than the investment necessary to prepare new personnel to replace them.

It has been said that the high rates of teacher dropout have at least a cost reducing effect: the average salary of the teachers tends to decrease since those deserting are those who are better paid. However, this has the disadvantage of decreasing the quality of education.

All means used to reduce the rate of deserting teachers will contribute in reducing training costs of teaching personnel.

K. CHANGES IN THE TEACHERS TRAINING SYSTEM

Possibilities should be considered for implementing specific programs for teachers until they are employed, and not before that. That is, teacher preparation should not be offered at the present normal schools as is customary, but, the individual, when entering service, should receive systematic professional training.

In this case, the student will receive only a part of the required training in specialized educational centers (Basic and Instrumental courses).

It is true that the partial training received by the students, that which could be called lower secondary or first cycle of the secondary level would not greatly qualify them to become teachers, but it does give them certain skills to be able to teach while they receive additional in-service training.

Evidence obtained from national literacy campaigns show that to be efficient in teaching how to read and write, the teacher does not have to have a much higher education than that of the students he is teaching. Consequently, the graduates from lower secondary or from the first cycle of secondary education could well teach the students of the primary level. However, the general opinion is that teacher education should be at a higher level than that of the student he teaches.

In Colombia, for example, all the graduates of the classic secondary school are required to work without pay during a minimum of 72 hours handling students at the telecenters where literacy programs are implemented. In Guatemala, the secondary education students must first have alphabetized a given number of persons (15 or 20 in order to graduate). This is done in the different literacy centers and is a requirement both in the official as well as in private schools.

At present, the developments in communication media have permitted humanity to be better and faster informed about scientific and technological advancements than it would have been through the contents of books or through the information often communicated by the teacher. This fact eliminates any supposition in the sense that the teacher must necessarily be above the students in given educational levels. Nowadays the teacher is considered to have the functions of guiding, orienting and directing debates arising in the classrooms in connection with different problems.

Training before service is very costly. For example, the unit costs of schools offering teacher training programs are higher than the unit costs of a primary school. In Venezuela, for example, they are five times higher, in Costa Rica three times higher, and in Mexico they are 16 times higher.

The difference in the cost per student at the lower secondary as compared to normal schools is also notable. The following data correspond to these countries: in Venezuela the cost per normal school student is three times higher than that of the secondary level; in Costa Rica it is twice as high, and in Mexico 12 times higher than that of the basic secondary or "junior high school".

In-service training is used both by developed as well as by underdeveloped countries; however, the purpose of such training differs.

In developing countries, the main objective is to offer essential teaching skills to the teacher, but in developed countries the main objective is to bring the teachers up to date with new educational techniques. For in-service training to be successful, it is obvious that it should be obligatory or rewarded in some way. An example of the above is found in Jamaica where graduates from secondary education are employed as teachers and then granted six (6) years to receive in-service training and to take an examination to obtain a degree, which is the lowest degree in the teaching profession.

In Costa Rica, for example, students having four years of secondary education may work in rural isolated regions, and receive training courses during several vacation periods until they obtain the equivalent preparation of teachers graduated from normal schools. However, during the period of study which can last from 3 to 4 years there are different financial incentives as they reach higher levels of training. These are set forth by the Civil Service Commission.

The method used to offer in-service training varies from country to country. Mexico uses mobile schools to improve the quality of the teachers in rural areas. Colombia uses educational television to give courses after classes and on Saturdays. These programs have resulted especially effective. Peru and Venezuela use television to give some technical training to supervisors. Television has a great advantage over the other communication media because it permits the teacher to observe good teaching techniques instead of only reading about them or to hear about them. Since television teaching differs from classroom teaching, the techniques cannot easily be adapted, but some of them can be used in the classroom.

Effects on Teacher Cost

1. There are no studies available to prove that in-service training, and not prior training, reduces the costs, but it is possible to be successful in increasing the product (quality).
2. If it is applied with the criterion of reducing the number of credentials required for salary increases, then it would indeed be feasible to obtain a reduction of the salaries that would later

have to be paid, that is if normal school teachers would be replaced by personnel with lower qualifications.

3. The permission to work without the proper training (lower teaching credentials), could increase the supply of teachers, thus permitting the hiring of personnel at a lower cost in places where they are hired by contract. This situation prevails in several countries, but only in the private sector.

Evaluation and Implications

The employment of persons with lower teaching qualifications may have effects on the quality of the product if the in-service training programs are deficient. If such training is permanently offered through tele-education (printed matter, books, radio, television, etc.) and if it is reinforced by direct courses during vacation periods, then it would be possible to obtain good results, since the educators would be able to demostrate their experiences and find an efficient aid during the direct in-service training period, besides the fact that the teacher would become more interested in and continue in his profession.

Problems which could arise could come from labor unions and be of a very subtle nature since the teachers working in the training centers might argue that the quality of education was being sacrificed and that their employment possibilities were being reduced. However, in Costa Rica, it is precisely the large labor unions which are interested in having the Ministry authorize in-service courses for teachers without degrees, and in other Central American countries no opposition has been encountered when the Ministries establish training periods for personnel without degrees.

OF AVERAGE LEVEL OF CREDENTIALS

to reduce the minimum average level for beginning teachers
ral, some group training methods (team teaching). For
tudy conducted in South Korea it was suggested that one
dents could be handled by a team with a highly qualified
associate teacher and two teacher assistants. There is
nformation available on just how much the expenses for
s are reduced when using team teaching.
nducted in United States schools suggest that team tea-
oes not reduce the costs of the teaching salaries. This
e in developing countries, where the shortage of well
may be decreased by using personnel with less educa-
on.
usly worthwhile keeping in mind the effects on the tea-
used by the decrease in teaching requirements.
erica it seems that the trend is rather to increase the
quirements of teachers in order to improve the quality
nsequantly, many countries have established teacher pre-
at a higher level (Costa Rica and Paraguay, for example).
reduce teacher salary costs is to use education students
s teachers as part of their curriculum requirements, at
The use of these individuals not only reduces the
it is also an economical way to train teachers.

M. CHANGES IN THE SALARY SCALE

Changing the criteria used to determine the salary schedules for teachers is another way to reduce expenditures for the salaries of teaching personnel. Generally, the salaries are based on the following:

1. Years of service, and
2. degrees and additional academic credits.

There is sufficient evidence available to suppose that years of teaching experience make the teacher more effective. However, it is reasonable to asume that after a few years of teaching (say five years) there is no further increase in the productivity of teachers. This would suggest that the salary increases should be made during the first five years. After that period salaries would be frozen. Besides threatening the social security benefits, this policy may obviously impel many teachers to leave their profession for more lucrative jobs. Consequently, it would be necessary to train new teachers, and the costs for the preparation of teachers would increase considerably.

The evidence is weaker when referring to the increase in the productivity of teachers when they obtain degrees and/or additional academic credits. The same happens with the in-service training programs. In this respect, it has been suggested that merit payment should be based on a continuous accumulation of credits and not on the degrees obtained.

In Latin America, the criteria for classification and promotion of teachers vary from country to country.

In Guatemala, for example, teachers receive a 20% increase on their base salary every five years, provided that during that period they have accumulated a minimum of 75 merit points from total 100. These increases, provided under the Law on Dignifying and Classifying the National Teaching Profession, were originated in a combination of years of service and merits and, on the other hand, it permits the teacher to double his starting salary after 25 years of service.

In Costa Rica, the law contemplates a yearly increase which can be estimated at 5% of the starting salary. These increases are granted only during the first 10 years of service. However, the possibility always exists of obtaining -at least every two years- a salary adjustment permitting the absorption of the cost of living increases. The salary equilibrium table established by the Educational Department of the Civil Service Commission does not allow educators to obtain salary increases within the same teaching level through other merits related to teaching, or to change category within a teaching level. The only way to obtain a higher salary would be to obtain another academic degree or to change to another teaching level. This may have a negative effect by discouraging the teachers to participate with interest in teaching, updating or self-improvement programs, since there are no financial incentives. The effects of this policy on the effectiveness of teachers should be determined, and consequently, its effects on the efficiency of the educational system.

In Venezuela, among other countries, the following is a criterion for salary increases: a teacher receives an increase for each child he has equal to an increase received by colleague without children, after a nine-year period of service.

As can be seen, all criteria followed in teaching salary increases affect the total costs of education and of the individual salaries for teachers. Therefore it would be advantageous to introduce adequate modifications in the methods of classifying teachers, permitting more efficient utilization of the resources allocated to salaries for educational personnel.

CHAPTER III

SUMMARY AND CONCLUSIONS

The so-called world educational crisis has a financial dimension which presents itself in an acute form in Latin America. The demands made by society on educational systems increasingly create financing problems.

Each year countries increase the portion of their Gross Domestic Product allocated to finance education, but, this increase is approaching or has reached a limit in some countries.

When financing needs exist, unit costs should be reduced even though contemporary educators and economists recognize that unit costs reduction is one of the most difficult tasks in education nowadays.

At present Latin American educational systems face many problems:

1. The population is young, since more than 60% of the inhabitants are under 24 years of age and the growth rate of the school-age population surpasses that of the total population.
2. Equal opportunity in education is uncertain. The inhabitants of rural zones have less advantages than those of the cities; children of laborers have less opportunities than those of professionals; fewer women than men attend schools.
3. Educational losses in terms of dropouts and repeaters are very high.
4. In many cases the teaching personnel is poorly qualified.

These factors create a complex situation and greater financing needs. Therefore it is considered imperative that the educational financing strategy should be directed towards the reduction of unit costs to a minimum without impairing the quality of education.

The following could be some of the measures to reduce unit costs:

1. Produce a more effective combination of educational inputs (teachers, buildings, materials, administration). For example, by increasing the number of students handled by each teacher, by using the buildings more efficiently, etc.
2. Improve school organization and operation. For example, by consolidating small schools, by using double shifts, by using volunteer workers, etc.
3. Introduce new technologies: radio, television, programmed instruction, etc.

The total costs to be reduced could be:

1. Capital costs (which are relatively fixed), and
2. variable costs which vary according to the number of enrolled students.

These total costs divided into the number of students make up the educational unit cost.

The magnitude of unit costs at the same level and type of education varies from country to country. One way to make comparisons among countries is to compare the cost per student with the per capita Gross Domestic Product.

There are many instruments which have already been tested in Latin

American countries to reduce unit costs in education. These instruments can be adapted for application in countries where they have not yet been tried. They affect one or more of the inputs making up educational expenditures: teachers, building and maintenance, materials and supplies, administration. Among the various instruments that showed applicability, the following can be mentioned: double shifts, consolidation, year round school, use of volunteers, regional cooperation, use of lower-cost materials, radio and television, programmed instruction, reduction of teacher wastage, change in teacher training systems, reduction of the number of credentials and degrees, and changes in salary scales.

All of them have advantages and disadvantages and present pedagogical, social, political, administrative and financial implications.

Before implementation, feasibility studies should be conducted on the specific areas where they are to be used. Before adopting cost reducing instruments it is highly recommendable to use pilot plans, experimental programs and all available means of educational and evaluative research. If they are applied unilaterally, disregarding the whole educational process, they may result more detrimental than beneficial. On the other hand, their timely, well arranged and planned use, may contribute to the solution of one of the greatest problems of educational systems today: the reduction of unit costs to a minimum.

BIBLIOGRAPHY OF PUBLICATIONS IN ENGLISH

Adams, A., "Year-Round School," American School Board Journal, July 1968, pp. 11-15.

Adams, Velma A., "The Extended School Year: A Status Report," School Management, Vol. XIV, June 1970, pp. 13-19.

Allen, J. E., Jr., "The All-Year-School -- Time for a New Look?" School Management, Vol. X, February 1966, pp. 86-92, 146-150, 152, 153, 156.

American Education, "Pint-size Tutors Learn by Teaching," Vol. III, No. 4, April 1967, pp. 20, 29.

American School and University, "Building Ideas that Save Money," Vol. 43, February 1971, pp. 13-42.

Anderson, A., "Fostering Educational Research in the Third World," Education and Development Reconsidered, Vol. II, Conference at Villa Serbelloni, Bellagio, Italy, May 3-5, 1972.

Anderson, C. A., and M. J. Bowman (eds.), Education and Economic Development, Chicago: Aldine, 1965.

Anderson, J., "The Harambee Schools: The Impact of Self Help," in R. Jolly, (ed.), Education in Africa: Research and Action, Nairobi: East African Publishing House, 1969, distributed by Northwestern University Press.

Anderson, J.E., The Organization and Financing of Self Help Education in Kenya, Paris: UNESCO-IIEP, mimeo, November 1970.

Anderson, R. H., "Organizational Character of Education: Staff Utilization and Deployment," Review of Educational Research, Vol. 34, No. 4, October 1964, pp. 455-469.

Averch, H., S. Carroll, T. Donaldson, H. Kiesling, and J. Pincus, How Effective is Schooling? A Critical Review and Synthesis of Research Findings, Santa Monica, California: The RAND Corporation, R-956 - PCSF/RC, March 1972.

Balderston, F. E., Cost Analysis in Higher Education, Berkeley: Ford Foundation Program for Research in University Administration, Paper P-33, July 1972.

Becker, G.S., Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education, New York: Columbia University Press, 1964.

Benson, C., "Teaching Methods and Their Costs," International Social Science Journal, Vol. XIV, No. 4, 1962, pp. 676-684.

Benson, C., The Economics of Public Education, Boston: Houghton Mifflin Company, 1968.

Benson, C., *Finance of Education: Training and Related Service in the Public Sector*, Islamabad: Government of Pakistan, 1970.

Bereday, G., "School Systems and the Enrollment Crisis: A Comparative Overview," *Comparative Education Review*, Vol. XII, No. 2, June 1968, pp. 126-138.

Bereday, G., and J. Lauwerys (eds), *Educational Planning: The World Yearbook of Education, 1967*, New York: Harcourt, Brace and World, 1967.

Beynon, J., "Educational Architecture vs. Educational Change," in Hallak (1967).

Blair, M., and R. G. Woodward, *Team Teaching in Action*, Boston: Houghton Mifflin Company, 1964.

Blandy, R., and M. Nashat, "The Education Corps in Iran: A Survey of its Social and Economic Aspects," *International Labour Review*, Vol. XCIII, No. 5, May 1966, pp. 521-529.

Blaug, M., *Economics of Education: A Selected Annotated Bibliography*, London: Pergamon Press, 1970.

Bowles, S., *Planning Educational Systems for Economic Growth*, Cambridge, Massachusetts: Harvard University Press, 1969.

Brammer, L., "Iran's Educational Revolution -- Military Style," *Comparative Education* Review, Vol. X, No. 3, October 1966, pp. 493-498.

Breneman D. W., *The Ph.D. Production Process: A Study of Departmental Behavior*, unpublished Ph.D. dissertation, Department of Economics, University of California, Berkeley, 1970.

Brickson, D., "The School Administrator," *Review of Educational Research*, Vol. XXXVII, No. 4, October 1967, pp. 417-432.

Brimer, M. A., and L. Pauli, *Wastage in Education, a World Problem*, Geneva: UNESCO-IBE, 1971.

Bucci, F. A., "Why Wait to Consolidate?" Clearinghouse, Vol. 42, No. 2, October 1967, pp. 104-109.

Carnoy, M., "Rates of Return to Schooling in Latin America," *Journal of Human Resources*, Summer 1967, pp. 347-358.

Carnoy, M., and H. Levin, *A Systems Approach to Research for Educational Development in Venezuela*, Caracas: Ministerio de Educación, Dirección de Planeamiento, 1970 (mimeo).

Carpenter, M. B., L. G. Chesler, H. S. Dordick, and S. A. Haggart, *Analyzing the Use of Technology to Upgrade Education in a Developing Country*, Santa Monica, California: The RAND Corporation, RM-6179-RC, March 1970.

Cerych, L., "The Integration of External Assistance with Educational Planning in Nigeria," in UNESCO-IIEP, 1969b, pp. 231-304.

Chaplin, W., "Merit Pay," American School Board Journal, July 1969, pp. 13-14.

Chavrasia, G., and G. Kaul, "Recent Trends and Developments in Primary and Secondary Education in India," International Review of Education, Vol. XIII, No. 3, 1967, pp. 345-353.

Chesswas, J., "Tanzania: Factors Influencing Change in Teachers' Basic Salaries," in UNESCO--IIEP (1972), Vol. I.

Chesswas, J., and J. Hallak, "Uganda: Behavior of Non-Teacher Recurring Expenditures," in UNESCO--IIEP (1972), Vol. III.

Chug, G., and W. Schramm, Learning from Television: What the Research Says, Washington, D.C.: National Association of Educational Broadcasters, 1968.

Cohn, E., "Economies of Scale in Iowa High School Operations," Journal of Human Resources, Fall 1968, pp. 422-434.

Coombs, P. H., The World Educational Crisis, London: Oxford University Press, 1968.

Coombs, P. H., and J. Hallak, Managing Educational Costs, London: Oxford University Press, 1972.

Coulson, J., "Computer-Based Instruction," International Review of Education, Vol. XIV, No. 2, 1968, pp. 140-152.

Curle, A., Educational Problems of Developing Societies, New York: Praeger, 1969.

Cypress, B., "Split Sessions are not the Same as the Plague," American School Board Journal, October 1970, pp. 28-9.

Danière, A., "Educational Planning: A Critical Review and Recommendations for A.I.D.," mimeo, 1969.

Denemark, G., and J. MacDonald, "Preservice and Inservice Education of Teachers," Review of Educational Research, Vol. XXXVII, No. 3, June 1967, pp. 233-247.

Durstine, R. M., and B. M. Hudson, "Barbados: Marginal Costs for Marginal Decisions -- The Case of Team Teaching," in UNESCO--IIEP (1972), Vol. II.

Eckstein, M., and H. J. Noah, Scientific Investigations in Comparative Education, London: Macmillan, 1969.

Edding, F., "Efficiency in Education," International Review of Education, Vol. X, 1964, pp. 393-402.

Edding, F., Methods of Analyzing Educational Outlay, Paris: UNESCO (Statistical Reports and Studies), 1966.

Educational Research Service, "Programmed Instruction in Large City School Systems," Circular No. 7, December 1966, pp. 11

Educational Research Service, "Teacher Aides in Large School Systems," Circular No. 2, April 1967.

Elvin, L., "The Recruitment and Preparation of Teachers," in Parnes (1962), pp. 181-194.

Fakouri, M., "Literacy Corps" A New Approach to Eliminate Illiteracy (Iran)," Contemporary Education, Vol. 42, No. 2, November 1970.

Gannon, E., "Education in the Sudan," Comparative Education Review, Vol. IX, No. 3, October 1965, pp. 323-330.

Goldman, R., "Textbook Production in a Small Country," The London Times Educational Supplement, April 1, 1966, p. 1002.

Gores, H. B., and A. C. Green (interview), "Building Ideas that Save Money," American School and University, Vol. 43, February 1971, pp. 13-32.

Greenough, R., "Asia -- Explosion in School Enrollments," School and Society, Vol. 100, February 1972, pp. 111-112, 134.

Guthrie, J. W., "A Survey of School Effectiveness Studies," in A. Mood, (ed.), Do Teachers Make a Difference? Washington, D.C.: U.S. Government Printing Office, 1970.

Hallak, J. (ed.), Educational Costs and Productivity, Paris: UNESCO--IIEP, 1967.

Hallak, J., "Areas for Improved Efficiency in Educational Systems," in Hallak (ed.) (1967), Chapter VIII.

Hallak, J., The Analysis of Educational Costs and Expenditure, Paris: UNESCO--IIEP (Fundamentals of Educational Planning, 10), 1969.

Hanning, H., The Peaceful Uses of Military Forces, New York: Praeger, 1967.

Hansen, W. L., "Human Capital Requirements for Educational Expansion: Teacher Shortages and Teacher Supply," in Bowman and Anderson (1965), pp. 63-88.

Hanushek, E. A., The Education of Negroes and Whites, unpublished Ph.D. dissertation, Department of Economics, M.I.T., 1968.

Harbison, F., and C. A. Myers, Education, Manpower, and Economic Growth, New York: McGraw Hill, 1964.

Harris, Seymour, More Resources for Education, New York: Harper and Brothers, 1960.

Hettich, W., "Equalization Grants, Minimum Standards, and Unit Cost Differences in Education," Yale Economic Essays, Vol. VIII, No. 2, pp. 3-55.

Hornik, R., H. Ingle, J. K. Mayo, J. A. Mayo, E. McAnany, and W. Schram, Television and Educational Reform in El Salvador: Report on the Third Year of Research, Research Report 10, Institute for Communication Research, Stanford University, March 1972.

Husen, T., "Priorities of International Research in Education," Education and Development Reconsidered, Vol. II, Conference at Villa Serbelloni, Bellagio, Italy, May 3-5, 1972.

Husen, T., "Some Thoughts Concerning Educational Technology," International Review of Education, Vol. XIII, No. 1, 1967, pp. 6-12.

International Bank of Reconstruction and Development (IBRD), Current Economic Position and Prospects of Pakistan, Vol. III, Education, July 17, 1970.

Jamison, D., Alternative Strategies for Primary Education in Indonesia: A Cost-Effective Analysis, Stanford, California: Graduate School of Business Research Paper 46, 1971.

Jamison, D., "Notes on Cost-Effectiveness Evaluation of Schooling in Developing Countries," mimeographed draft copy, June 1972.

Jensen, G., "Year-round School: Can Boards Sidestep it Much Longer?" American School Board Journal, July 1969, pp. 8-12.

Johnson, W., "Administrative Specialists," American School Board Journal, April 1963, p. 11.

Judy, R. W., Costs: Theoretical and Methodological Issues, paper presented at the North American Conference on Cost-Benefit Analysis of Manpower Policies, University of Wisconsin, Madison, May 14-15, 1969.

Katzman, M., The Political Economy of Urban Schools, Cambridge, Massachusetts: Harvard University Press, 1971.

Knight, J.B., "The Costing and Financing of Educational Development in Tanzania," in UNESCO--IIEP, (1969b).

Knirk, F.G., "Technology and Curriculum Planning: Cost-Effectiveness of Instruction," Audiovisual Instruction, Vol. XIII, March 1968, pp. 260-262.

Kumata, H., " A Decade of Teaching by Television," in W. Schramm (ed.), The Impact of Educational Television, Urbana: University of Illinois Press, 1960, pp. 176-185.

Lebedyev, P., "Educational Techniques and Problems of Programmed Instruction in the USSR," International Review of Education, Vol. XIII, No. 1, 1967, pp. 26-35.

Leite, M.F., P. Lynch, J. Sheehan, and J. Vaizey, The Economics of Educational Costing: Inter-Country and Inter-Regional Comparisons, Volumes I-III, Lisbon: Instituto Gulbenkian de Ciencia, 1968.

Lewis, L. J., "Getting Good Teachers for Developing Countries," *International Review of Education*, Vol. XVI, No. 4, pp. 393-405.

London Times Educational Supplement, "The Army Hand Over -- Camp Becomes School and College," June 11, 1965, p. 1834.

London Times Educational Supplement, "Rural School Reorganization in Hungary," February 4, 1966.

London Times Educational Supplement, "Soviet Ways of Beating the Teacher Dearth,' March 17, 1967, p. 896.

Machlup, F., *The Production and Distribution of Knowledge in the U.S.*, Princeton: Princeton University Press, 1962.

Marklund, Sixten, "School Organization, School Location, and Student Achievement," *International Review of Education*, Vol. XV, No. 3, 1969, pp. 295-318.

McAnany, E., J. Mayo, and R. Hornik, *Television and Educational Reform in El Salvador*, Research Report 4, Institute for Communication Research, Stanford University, July 1970.

Ministry of Education, Government of India, *Report of the Education Commission 1964-66: Education and National Development*, New Delhi: Government of India Press, 1966.

Morgan, R.M., and C. B. Chadwick (eds.), *Systems Analysis for Educational Change: The Republic of Korea*, Tallahassee, Florida: Department of Educational Research, Florida State University, April 1971.

National Elementary Principal, "Volunteer On-the-Job Training Pays Off," Vol. III, January 1971, pp. 55-56.

Nitsch, M., 'Fundamental Integral Education: Radio Schools in Latin America," *Comparative Education Review*, Vol. VIII, No. 3, December 1964, pp. 340-343.

Oddie, Guy, *School Building Resources and Their Effective Use*, Paris: OECD, 1966.

OECD, *Budgeting, Programme Analysis and Cost-Effectiveness in Educational Planning*, Paris: OECD, 1968.

OECD, *Development and Economy in Educational Building*, Paris: OECD, 1968.

OECD, *Econometric Models of Education*, Paris: OECD (Technical Reports), 1965.

OECD, *Efficiency in Resource Utilization in Education*, Paris: OECD (Technical Reports), 1969.

OECD, *The Residual Factor and Economic Growth*, Paris: OECD (Study Group in the Economics of Education), 1964.

Olds, H. E., *Team Teaching*, New York: Harper & Row, 1964.

Pandit, H. N., *A Study in Unit Costs at School Stage in India*, New Delhi: National Institute of Education, August 1968.

Parnes, H.S., (ed.), *Planning Education for Economic and Social Development*, Paris: OECD (The Mediterranean Regional Project), 1962.

Poignant, R., *et*. *al*., "The Financing of Educational Expenditure 1970-80," *Series B: Opinions*, International Commission on the Development of Education, UNESCO, 1971.

Rice, R., "A Second Chance for Dropouts," *School and Society*, Vol. 98, No. 2328, November 1970, pp. 434-4.

Riew, John, "Economies of Scale in High School Operation," *Review of Economics and Statistics*, August 1966, pp. 280-287.

Rioux, J. W., "Here are 14 Ways to Use Nonteachers in Your School District," *Nation's Schools*, Vol. 76, No. 6, December 1965, p. 42.

Robinson, E. A.G., and J. Vaizey, *The Economics of Education*, London: Macmillan, 1966.

Rogers, D.C., "Private Rates of Return to Education in the United States: A Case Study," *Yale Economic Essays*, Vol. IX, No. 1, Spring 1969, pp. 89-134.

Rosenberg, N., "School Sizes as a Factor of School Expenditures," *Journal of Secondary Education*, Vol. 45, No. 3, March 1970, pp. 135-142.

School and Society, "AID -- Peace Corps Build Schools in Somalia," Vol. 98, No. 2327, October 1970, pp. 338-340.

Schramm, W., *Programmed Instruction -- Today and Tomorrow*, Fund for Advancement of Education, November 1962.

Schramm, W., P.H. Coombs, F. Kahnert, and J. Lyle, *New Educational Media in Action: Case Studies for Planners (Volumes I, II, and III)*, Paris: UNESCO -- IIEP, 1967a.

Schramm, W., P. H. Coombs, F. Kahnert, and J. Lyle, *The New Media: Memo to Educational Planners*, Paris: UNESCO -- IIEP, 1967b.

Sheehan, J., "The Problem of International Comparisons of Unit Costs in Education," *Comparative Education Review*, Vol. XIV, No. 2, June 1970, pp. 186-198.

Spaulding, S., "Research on Content, Methods, and Techniques in Education for Development," Review of Educational Research, Vol. XXXVIII, No. 3, June 1968, pp. 277-292.

Speagle, Richard E., *Educational Reform and Instructional Television in El Salvador: Costs, Payoffs, and Benefits*, a report prepared for the Agency for International Development, October 1971.

Gorfinkel, M. Kurz, and S. Weiner, *A Benefit/Cost Model*
ducational Programs, Menlo Park: Stanford Research
nuary 1963.

nd H. W. Carothers, *The Year-round Calendar in Operation*,
thern Regional Education Board, 1963.

nd J. Horai, "Tactics and Costs of Illiteracy War,"
orum, Vol. XXXI, No. 1, No ember 1966, pp. 85-90.

Carnoy, *Cost-Benefit Analysis in Education: A Case*
a, Washington, D.C.: International Bank for Recon-
Development, November 1969.

ca -- Audio-Visual Education in the Ivory Coast,"
ciety, Vol. 98, No. 2328, pp. 424-426.

"Iran's Tent Schools," Vol. 58, No. 1, January 1969,

ome Cost Aspects of Selected New Educational Media,
d for seminar "Financing Educational Systems in
untries," IIEP, September 6-10, 1971, Paris: IIEP,
71.

and Agricultural Development, Paris: UNESCO, 1964.

Problems of Rural Education, Paris: UNESCO--IIEP
of Educational Planning, 7), 1968.

ational Development in Africa: I - The Planning Process,
O--IIEP, 1969a.

ational Development in Africa: II - Costing and Finan-
UNESCO, 1969b.

ational Development in Africa: III - Integration and
n, Paris: UNESCO--IIEP, 1969c.

ational Cost Analysis in Action: Case Studies for
umes I-III, Paris: UNESCO-IIEP, 1972.

f Free Flow of Information, *Rural Mimeo Newspapers:*
e Production of Low-Cost Community Papers in Develop-
, Paris: UNESCO (Reports and Papers on Mass Communi-
1965.

nal Conference on Education, *The Statistical Measure-*
tional Wastage(Drop-Out, Repetition, and School Re-
aris: UNESCO, June 24, 1970.

sts of Education, London: Allen and Unwin, 1958.

D. Chesswas, *The Costing of Educational Plans*,
of Educational Planning, 6), Paris: UNESCO--IIEP,

Vaizey, J., and J. Sheehan, Resources for Education: An Economic Study of Education in the United Kingdom, 1920-1965, London: Allen and Unwin, 1968.

Van Rensburg, P., "Swaneng Hill School," Convergence, Vol. IV, No. 2, 1971, pp. 89-93.

Vera, O., "The Educational Situation and Requirements in Latin America," in E., de Vries and J. Echavarria (eds.), Social Aspects of Economic Development in Latin America, Volume I, Paris: UNESCO, 1963.

White, K., "A Plan for Student Interns in Teaching Positions," American School Board Journal, April 1963, p. 9.

Williams, T. D., "Educational Development in Ghana and Guatemala: Some Problems in Estimating Levels of Educational Growth," Comparative Education Review, Vol. X, No. 3, October 1966, pp. 462-469.

Williams, T.D., "Wastage Rates on Teacher Quality in Guatemalan Primary Schools," Comparative Education Review, Vol. IX, 1965, pp. 46-52.

Winkler, D.R., The Production of Human Capital: A Study of Minority Achievement, unpublished Ph.D. dissertation, Department of Economics, University of California, Berkeley, 1972.

Winn, I. J., "Paradox and Perspective in Technical Assistance to Latin America," International Review of Education, Vol. XV, No. 1, 1969, pp. 27-39.

Woodhall, M., Cost-Benefit Analysis in Educational Planning, Paris: UNESCO--IIEP, (Fundamentals of Educational Planning, 13), 1970.

Woodhall, M., "The Use of Cost-Benefit Analysis to Compare the Rates of Return at Different Education Levels: A Case Study in Colombia," in UNESCO--IIEP (1972), Vol. II.

Woodhall, M., "United Kingdom: The Use of Cost Analysis to Improve Efficiency of School Building in England and Wales," in UNESCO--IIEP, (1972), Vol. III.

Worzalla, L., "Various Factors Boost Building Costs," American School Board Journal, January 1967, pp. 33-34.

SPECIALIZED BIBLIOGRAPHY IN ENGLISH

During 1973 several agencies produced a large quantity of publications evaluating the use of radio and television in education. The following are some of the publications reviewed for this study.

Horkik, Robert C. et. al., Television and Educational Reform in El Salvador, Stanford University: Institute for Communication Research, 1973. (Research Report N°14 on the El Salvador Educational Reform and Television Project)

Jamison, Dean with Steven Klees, The Cost of Instructional Radio and Television for Developing Countries, Stanford University: Institute for Communication Research, 1973.

Jamison, Dean et. al., The Effectiveness of Alternative Instructional Media, Stanford University: Institute for Communication Research, 1973.

Jamison, Marshall with Stephen T. Bett, Satellite Educational System Costs for Three Model Developing Countries, U.S. Government: Executive Office of the President's Office of Telecommunications Policy, 1973.

Mayo, John K. et. al., The Mexican Telesecundaria: A Cost Effectiveness Analysis, Stanford University: Institute for Communication Research, 1973.

Schmelkes de Sotelo, Silvia, The Radio Schools of the Tarahumara, Mexico: An Evaluation, Stanford University: Institute for Communication Research, 1973.

Spain, Peter L., A Report on the System of Radio Primaria in the State of San Luis Potosí, Mexico, Stanford University: Institute for Communication Research, 1973.

Speagle, Richard E., Educational Reform and Instructional Television in El Salvador: Costs, Benefits, and Payoffs, Academy for Educational Development, U.S.A., 1973.

BIBLIOGRAPHY OF PUBLICATIONS IN SPANISH AND PORTUGUESE

Andrade, Raizabel, "Manual Metodológico para el Análisis Comparativo de la Asignación de los Recursos Educacionales en los medios Urbano y Rural", Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela, 1973.

Argentina, "Análisis de Gastos Corrientes en el Sector Educación", Ministerio de Cultura y Educación, Dirección Nacional Sectorial de Desarrollo, 1972.

Argentina, "Análisis de Gastos y Costos de Educación" Ministerio de Cultura y Educación, Dirección Nacional Sectorial de Desarrollo, 1972.

Argentina, "Estadística Educativa, Síntesis, 1968-1972", Ministerio de Cultura y Educación, Departamento de Estadística, 1973.

Barrios, Hildebrando, "Tasa Social de Retorno de la Educación Pública, Metodología y Cálculo .(zona Metropolitana de Caracas, 1970)". Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela, 1973.

Bosch, José María, "Financiamiento de la Educación en Guatemala", Ministerio de Educación, Oficina de Planeamiento Integral de la Educación. Guatemala, 1973, (Documento del Primer Seminario sobre Aspectos Prioritarios para la Programación Educativa

Brasil, "Análisis Economica do Sistema Educacional de São Paulo, Volume I", Instituto de Pesquisas Economicas, Faculdade de Economia e Administração de Universidade de São Paulo, 1970.

Brasil, "Catalogo FENAME", Ministerio de Educação, Fundação Nacional de Material Escolar, 1973.

Brasil, *Ensino de 1°e 2° Graus*. Ministerio de Educacao e Cultura, Departamento de Apoio, Diretoria de Documentaçao e Divulgaçao, 1971.

Brasil, "Estatisticas da Educação Nacional 1960-71", Ministerio da Educação e Cultura, Secretaría General, Servicio de Estatistica da Educação e Cultura, 1972.

Brasil, "Financas Públicas da Educação No Brasil", Ministerio da Educação e Cultura, Secretaria Geral, 1972.

Brasil, *Relatorio da Situacão da Rede Fisica Escolar Estadual do Estado de São Paulo*, Governo do Estado de Sao Paulo, Secretaria de Estado dos Negocios da Educação, Fundo Estadual de Construções Escolares, 1972.

Colombia, "Escuelas Radiofónicas, Modernización. Innovatividad y Grado de Desarrollo Regional", Acción Cultural Popular, Departamento de Sociología, Bogotá, 1970

Colombia, "Estudio sobre Costos de la Educación Media Oficial en Colombia" Ministerio de Educación Nacional, Instituto Colombiano de Pedagogía, 1972 (Doc. ICOLPE 97/IE 67/VI-72).

Colombia, *Información Bibliográfica Educativa*, Instituto Colombiano de Pedagogía, 1972.

Colombia, "Modelos de Flujos, Costos y Rendimiento Marginal de la Educación Primaria - Informe Final, Ministerio de Educación Nacional, Instituto Colombiano de Pedagogía", 1973 (Doc. ICOLPE 149/IE, 98/IX-73).

Colombia, "Porqué Concentraciones de Desarrollo Rural", Instituto Colombiano de Pedagogía, (Doc. ICOLPE 107/EA-15/22-V-72) 1972.

Costa Rica, "Estadísticas del Sistema Educativo Costarricense, 1969-1972", Ministerio de Educación Pública, Dirección General de Desarrollo Educativo, Unidad de Estadística, 1973.

Costa Rica, "Los Costos y la Racionalización del Gasto en Educación (Documento de Trabajo del Taller-Seminario de Revisión de la Marcha del Plan Nacional de Desarrollo Educativo, Octubre de 1973).

Costa Rica, *Planeamiento del Desarrollo Educativo*, Diagnóstico, Ministerio de Educación Pública, 1971.

Costa Rica, *Planeamiento del Desarrollo Educativo*, *Los Grandes Objetivos*, Ministerio de Educación Pública, 1971.

Costa Rica, *Planeamiento del Desarrollo Educativo*, Programación, Ministerio de Educación Pública, 1971.

Ecuador, "Evaluación del Plan Ecuatoriano de Educación", Ministerio de Educación Pública, Departamento de Planeamiento Integral de la Educación, 1973.

El Salvador, *Plan Quinquenal del Ramo Educación 1973-1977*, Oficina de Planeamiento y Organización, Ministerio de Educación (Documento Técnico 72-3) El Salvador, 1972.

Estrada B., Amílcar, "Análisis de los Costos Educativos por niveles de Enseñanza" Ministerio de Educación, Oficina de Planeamiento Integral de la Educación, Guatemala 1973, (Documento del Primer Seminario sobre Aspectos Prioritarios para la Programación Educativa).

Guatemala, "Plan Nacional de Educación para la República de Guatemala, Diagnóstico y Pronóstico 1972-1980" Ministerio de Educación, Oficina de Planeamiento Integral de la Educación, 1973.

Johnson Vogeler, Susan, "Manual Metodológico sobre un Análisis del Efecto del Gasto en el Rendimiento Escolar" Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela, 1973.

México, *Educación Primaria*, *Análisis de Población no atendida*, Secretaría de Educación Pública, Sub-Secretaría de Planeación y Coordinación Educativa, Dirección General de Planeación Educativa, 1972.

México, *Estadística Básica del Sistema Educativo Nacional 1972-1973*, Secretaría de Educación Pública, Sub-Secretaría de Planeación y Coordinación Educativa, Dirección General de Planeación Educativa, 1973.

México, "Prontuario Estadístico", Secretaría de Educación Pública, Dirección General de Planeación Educativa, 1973.

Mollejas, Gustavo, "Análisis Comparativo del Gasto por alumno y la Estructura del Gasto en los Programas de Primaria y Media del Ministerio de Educación en Venezuela para los años 1969 y 1971", Ministerio de Educación. Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela, 1973.

Mollejas, Gustavo, "Manual Metodológico sobre el Análisis del Gasto por alumno y la Estructura del gasto en los Programas de Primaria y Medio del Ministerio de Educación de Venezuela", Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela, 1973.

Mollejas, Gustavo y Susan Vogeler, "El Gasto por alumno y la Estructura del Gasto en los Programas de Primaria y Media del Ministerio de Educación en Venezuela en 1971", Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela. 1973.

Panamá, "Aspectos Económicos de la Educación en Panamá", Ministerio de Educación, Dirección Nacional de Planeamiento Educativo, 1973.

Panamá, *El Problema de la Repitencia*, Dirección Nacional de Planeamiento Educativo, Ministerio de Educación, 1973.

Paraguay, "Estudio del Financiamiento de la Educación Paraguaya, Años: 1966-1980" Ministerio de Educación y Culto, Dirección de Servicios A Administrativos, Departamento Central Contable (Sin fecha).

Paraguay. *Plan de Desarrollo Educacional 1969-1980*, Tomo II, Ministerio de Educación y Culto, 1970.

Perú, *El Financiamiento de los Gastos de Educación en el Perú 1960-1972* Dirección de Programación Presupuestaria, Oficina Sectorial de Planificación, Ministerio de Educación, 1973.

Perú, "Ley General de Educación, Decreto Ley N° 19326", Ministerio de Educación, 1973.

Perú. *Plan Bienal 1973-1974*. *Sector Educación*, Oficina Sectorial de Educación, Ministerio de Educación. 1973.

Perú, *Plan Nacional de Desarrollo 1971-1975*, Volumen VIII, Plan de Educación, 1972.

Perú, "I Seminario Nacional de Estadísticas Educacionales, Informe Final" Sector Educación, Perú, 1973.

Quintero, María Elena H. de, "Bases para un Glosario de Términos sobre Costos de la Educación", Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela. 1973.

Quintero, María Elena H. de, "Bibliografía sobre Costos de la Educación", Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela, 1973.

Sánchez, Elvia de, Estudio de la Remuneración al Personal Docente de Primaria del Ministerio de Educación con una muestra de 450 Maestros", Ministerio de Educación. Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela, 1973.

Sánchez, Elvia de, "Manual Metodológico sobre estudio de la Remuneración al personal Docente de Primaria con una Muestra de 450 maestros", Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, Venezuela, 1973.

Venezuela, "Ensayos sobre Teoría y Metodología de la Investigación Educacional" Ministerio de Educación, Dirección de Planeamiento, Departamento de Investigaciones Educacionales, 1973.

Venezuela, "Guía de Estudio sobre Investigación y Planificación de Costos de la Educación" Ministerio de Educación, Dirección de Planeamiento Departamento de Investigaciones Educacionales, 1971 (Documento preparado en el Primer Seminario sobre Investigación y Planificación de Costos de la Educación).

Venezuela, "Metodología de Análisis de Costos de las Construcciones Escolares en Venezuela", Ministerio de Educación, Dirección de Planeamiento, Departamento de Estudios de Construcciones Escolares, 1972.

Venezuela, "Proyecto Piloto para la Nuclearización del Sistema Educativo en Venezuela", Ministerio de Educación. Dirección de Planeamiento, Departamento de Estudios de Construcciones Escolares, 1973.

ANNEX I

CASE STUDIES

GENERAL EXPLANATION

CASE 1: DEVELOPMENT OF PRESCHOOL EDUCATION (Venezuela)

CASE 2: FIVE-DAY SCHOOL WEEK (Brazil)

CASE 3: TEACHING BY RADIO IN SAN LUIS POTOSI (Mexico)

CASE 4: TEACHING BY TELEVISION (Brazil)

CASE 5: 12-MONTH EDUCATIONAL SCHEDULE (Brazil)

CASE 6: PRODUCTION OF TEXTBOOKS AND OTHER EDUCATIONAL MATERIALS (Brazil)

CHARTS

1. TEXTBOOKS PUBLISHED BY FENAME DURING THE PERIOD 1968-73
2. SCHOOL MATERIALS PREPARED BY FENAME DURING THE PERIOD 1968-73

CASE STUDIES

GENERAL EXPLANATION

This chapter is an annex to the manual. It contains six Latin American experiences having a great effect on the components weighing most on educational costs. They are described separately in order to explain them in more detail, since it was not possible to do so in the manual.

The implementations described are the following:

1. Development of Preschool or Initial Education (Venezuela).
2. The Five-Day School Week (Brazil).
3. Teaching by Radio in Primary Schools of San Luis Potosí (Mexico).
4. Teaching by Television in the State of Marañón (Brazil).
5. The Twelve Month School Year in the States of Bahía, Amazonas, Río de Janeiro and part of Guanabara (Brazil).
6. Production of Textbooks and other Educational Materials (Brazil).

We have considered that a more detailed presentation of these cases is justified because of the following reasons:

1. The first four affect the highest educational cost component, teacher input, without decreasing present salaries nor the social benefits earned by teaching, meaning that there would be less labor union and political implications involved in their application.
2. The fifth one affects a component which has been increasing significantly (buildings), and permits the temporary solution of this problem.
3. The sixth case contributes to the democratization of teaching,

offering all students equal opportunities to obtain textbooks and other educational materials at low cost throughout the country. Furthermore, the improvement of the quality of the teachers work permits the attainment of desirable effects as far as the internal efficiency of the system is concerned.

To facilitate the reading of these experiences, each one of them is developed following the same structure. They start with an *introduction* offering general information, time and the place where applied. Then a *description* allows the reader to obtain a more detailed idea of the contents. The *effects* on the different cost components are discussed next, and lastly the *evaluation and implications* resulting from the application of the instrument are considered. In some cases prerequisites which should be considered before the instruments are used are discussed, and some explanatory graphs are also included.

The cases are separated and numbered independently. Thus they can be studied separately without any difficulty whatsoever.

DEVELOPMENT OF PRESCHOOL EDUCATION

(VENEZUELAN CASE)

INTRODUCTION

The so-called preschool level of the educational systems has been universally neglected. In Latin America the percentage of children from four to six years old in school is considerably lower than that of children from seven to twelve years old.

The following is an example: in 1971 only five percent of the five-year old Brazilian children where enrolled in school. For six-year old children the rate increased to 23%, and for seven-year olds (starting age of the school level) the rate was 68%. As can be noted, present educational systems apparently act as if they are not interested in preschool children.

However, a growing number of educational leaders are proclaiming that the preschool level should be the principal objective of educational strategy and the essential prerequisite for any long term educational policy, since it is precisely in the preschool age group where the best conditions for full physical and mental development of future citizens should be insured. Consequently, it is with this age group that countries should take effective steps to improve the output of their educational systems.

Thus, in the near future it can be expected that many countries will concentrate efforts in preschool educational development, and consequently they will need more resources. Efficient use of these resources will become more imperative.

The case which describes the way Venezuela is handling this problem is presented as an example: "The Project to grant more attention to preschool students in Venezuela".

DESCRIPTION

Background

In 1972, the Venezuelan Ministry of Education identified and exposed two basic problems concerning preschool education:

1. Over one million children of preschool age were not incorporated in the educational system.
2. Financial resources for insuring the constant growth of preschool education were notably insufficient.

Based on these conclusions, consideration was given to a project having as its main objective the massive incorporation of preschool age children into the educational system.

Some Characteristics of the Project

1. Utilization of existing and available resources for classrooms. Such places as public or private parks, open spaces with green areas, headquarter offices of associations, regional school offices, etc. were used.
2. Multi-institutional participation to make possible the integration of efforts both from the public as well as from the private sector.
3. Community participation in preschool education.
4. Installation of "Preschool Nuclei" functioning as educational units to give attention to 30 to 200 children.

5. Installation of 'Preschool Centers" operating as technical-administrative units to advise and supervise the operation of the nuclei.
6. Use of volunteers as auxiliary teachers.
7. Gradual expansion, starting in the metropolitan area and progressively expand to the different regions of the country.
8. Experimental organization.
9. Emphasis on children from lower classes.
10. Integral attention to the preschool child: education, nutrition, health, recreation, socio-economic assistance and legal protection.

The Role of Volunteers

The use of volunteers is an important feature of the project. This is a good way to reduce unit costs*.

Volunteer mothers assist the teacher in different activities:

- Teaching tasks
- Reception and dismissal of the children
- Supervision during recreation periods
- Companions and guides during outings and visits programmed as part of the educational activity
- Distribution of food
- Infirmary and fist aid
- Accompanging children when receiving medical service

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* Remember that the project aims at solving the problem of budgetary shortages.

- Cleaning and decoration of the classroom
- Preparation of teaching material
- Maintenance and preservation of the classroom, furniture and teaching materials.
- Protection and supervision of the classroom

Besides the mothers, young people from the community can also contribute to the development of preschool teaching. If these young people are university students they can help with special activities in their major area of study: Phychology, Sociology, Social Work, Medicine, etc.

This system has the so-called "Volunteer Banks" which gather and store information on characteristics and availability of community volunteers.

There is also a volunteer incentive program, including:

- Honourable mentions
- Free tickets for the theater
- Commercial discounts
- Scholarships
- Work bags
- Trips, etc.

Preschool Centers and Nuclei

Preschool centers and levels have been established to direct the project.

The preschool center is the administrative structure in charge of Direction, Guidance, Coordination, Supervision, Control and Evaluation of a group of nuclei. The nucleus is a unit formed by a teaching team:

teers

ildren

f a center is formed by Directors, coordinators, pro-
rsonnel and other non-teaching technical personnel
trists, psychologists, sociologists, socialworkers,

formed by sections of 36 to 40 students each. The
ucted in public or private parks or available spaces
reas to insure their use by children carrying out

for preschool education such as the one described
owth and quality improvement which should benefit
the formal educational system.
unteers in teaching and auxiliary teaching work, and
isting spaces are saving sources which decrease the
ool education.
fited through this innovation are the following:

ther can handle a greater number of students since he
olunteers. When the student/teacher ratio increases,
produce a greater output.

Buildings

Since already existing spaces are used, the number of new buildings needed is reduced.

Administration

Volunteer work will considerably contribute to administrative tasks and, consequently, expenditures for administrative personnel will be reduced.

EVALUATION AND IMPLICATIONS

This preschool educational schedule deserves to be tried; combined with other possibilities it may represent valuable savings and permit considerable progress in the improvement and expansion of preschool educational services. For example, if the basic Venezuelan idea is combined with the El Salvador* proposal (offering preschool education during weekends) the results might be highly beneficial.

Planners of the El Salvador Ministry of Education have considered that if the entire preschool age population is enrolled in the traditional system financial resources would not be sufficient.

Therefore, El Salvador intends to expand the traditional preschool system through a parallel program in which only the objective of "preparing" the child is complied with. Thus, they can offer preschool educational services to a large sector of the population which otherwise would not even have been able to receive pre-primary education.

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* PLANNING AND ORGANIZATION OFFICE. TECHNICAL DOCUMENT 72-3 Five year Educational Plan, 1973-1977. Ministry of Education, Republic of El Salvador, pages 39-41.

One starts from the basic premise that a child can be prepared to enter primary school with approximately 160 hours of classroom experiences. This could be offered in forty four-hour sessions, which could be held on Saturday mornings during the school year.

Existing primary school classroom space, unused on Saturdays, could be occupied. The same primary teachers would teach the preschool classes, earning an extra-salary. The children would only have to travel once and the transportation and travel time problems would be considerably reduced. However the problem of what to do with the children from Mondays through Fridays in homes where both parents work would still exist.

The El Salvador technicians believe that if this system is adopted by 1977, 50,600 children could be handled at a cost of $2.8 per student, while in the traditional system only 26,200 children are handled at a cost per student twelve times higher, that is, $34 per student.

Obviously, a combination of the Venezuelan project and the forty Saturday sessions proposed by El Salvador would permit notable unit cost reductions in the different inputs making up educational expenditures.

The teachers would be able to handle a greater number of children and relatively low salary increases would be required to absorb these high enrollment increases.

The number of buildings needed would decrease, since existing spaces would be used more efficiently. However, some questions arise, above all with respect to the El Salvador system.

If it is accepted that 160 hours are enough to "prepare" the child for primary school, would it be recommendable to offer one-hour classes ?

Or should there be 80 two-hour classes ? Or 40 four-hour classes ? Or 20 eight-hour classes ?

More considerations should be granted to the number of hours needed to "prepare" children and to how this number of hours should be organized.

On the other hand, it should be considered that primary classrooms will have to be adapted for preschool classes. Between Friday to Saturday, classrooms will have to be rearranged and then rearranged again Monday.

As can be observed, even though the Venezuela model and the El Salvador proposal present ways to reduce preschool level costs, it would be advantageous to analize the concrete situation in each country at the time of either adopting or adapting them.

The analysis should, among other things, determine the following:

1. Enrollment demand under these conditions
2. Spaces available
3. Characteristics and available time of the possible volunteers, etc.

FIVE-DAY SCHOOL WEEK

INTRODUCTION

The objectives of the Administrative Reforms of the Brazilian Ministry of Education and Culture, decreed in March 1970, underline the need to find alternatives for achieving greater efficiency and rationality in school construction, or in the utilization of the physical capacity of the present school network. Thus, the II National Educational Conference held in Porto Alegre gave special attention to problems of school construction in view of the expected increases in school enrollment.

Several documents of other government organizations which participate in the educational process, expressed concern about improving the system, especially in the utilization of school buildings in view of the immediate necessity to expand enrollment. This expansion was expected through the implementation of Basic Education (first and second grades in Brazil or primary and secondary education in other countries) provided under Law 5692 of August 11, 1971 which set forth the bases and guidelines for the new structure of the Brazilian educational system.

The Basic Education Bureau made some suggestions for the rational use of educational facilities in this respect. One of the alternatives consisted in reducing the school week from six to five days, for the purpose of organizing an extra group during the day off. This system was implemented in many educational centers of Brazil at a later date, thereby increasing the enrollment capacity in the existing buildings.

DESCRIPTION OF THE INSTRUMENT

This alternative consists in reducing the present school week from six to five days, applying it to students and teachers, or only to the former. Thus, there will be a day off for each group on different days, permitting the organization of an extra student group. The objective is to solve the following problems:

- Classroom shortage
- Lack of funds to expand the Educational System
- Teacher shortage
- Social demand for a minimum educational level (for example, complete primary schooling)

The criterion determining whether the five-day school week is established so that students and teachers leave the building on their day off, or that it apply only to students, will depend on the problem to be solved.

A. If the problem refers only to classroom shortage, students and teachers may have the following options:

1. Add an extra day off in each week.
2. Organize out-of-classroom activities (visits to museums, exhibitions, libraries, recreation, preparation of cultural activities, study halls, etc).

Referring only to teachers:

3. Plan the activities of the school week.
4. Help carry out certain administrative and technical tasks in the school (computation of statistical data, library guidance, evaluation, etc.).

B. If the instrument is implemented for the purpose of minimizing unit costs in the building and teacher components, then the educators would handle the extra student group on their day off using core teaching methods. These groups may belong to the highest grade offered, or any of the other grades. This would depend on the school structure of the school, but the reduction is the same in both cases.

Thus we are able to take care of a population equivalent to six groups with the budget to cover the salaries of five teachers, either because the school is full at all teaching levels or because there are two sections of the same group.

POSITIVE ASPECTS:

Now, by implementing the instrument, two advantageous results are obtained:

1. Reduction of the building/student unit cost without decreasing the space per student according to established norms.
2. Reduction of the average salaries of the teachers without increasing working hours, the student/teacher ratio and without lowering the existing salary, nor altering their already earned fringe benefits.

However, other economies of scale can be obtained, provided that upon reducing the personnel required for teaching and administrative services, personnel training and pension plan expenses are also reduced because of less demand.

The instrument permits reaching economies up to 16.66% in each of the inputs described in items one and two when the school operates on a shift with equal number of teachers and students in the morning as well as in the afternoon, but this reduction is doubled if the school operates on a double shift or alternate schedule with different groups of students with different teachers.

The alternatives previously mentioned in paragraph "A" and referring to utilization of the day off, permit reaching a 16.66% reduction in the unit cost per student/building; while alternative "B" also reports a 16.66% reduction in school operating costs. In other words, it turns out to be a reduction in the average teacher salaries.

If the instrument is implemented in its two forms (building and teachers), a 33.33% cost reduction will be reached in the school shift with equal number of students and teachers during mornings and afternoons, but if it is applied in a double shift with two different groups of students and different teachers, then the cost reduction will be doubled.

APPLICATION OF THE MODEL

Let us suppose that we have a school with five (5) classrooms and five (5) teachers, and our purpose is to integrate the school, that is, to offer all six grades within this structure, since countries which have a five-grade elementary school could well add an extra section to take better advantage of space and teachers.

Example:

5 teachers at $150 per month is equal to $900 per year.

35 students enrolled in 5 groups is equal to 175 students

35 students enrolled in 6 groups is equal to 210 students.

For 5 groups: $c_1 = \dfrac{\$9000}{175} = \$\ 51.43$

For 6 groups: $c_2 = \dfrac{\$9000}{210} = \$\ 42.86$

$$D/c = c_1 - c_2 = \$51.43 - \$42.86 = \$8.57$$

$$\%/r = \frac{D/c\ .\ 100}{c_1} = 16.66$$

in which:

c_1 = cost per student with five groups

c_2 = cost per student with six groups

D/c= cost difference

%/r= reduction percentage reached

SUMMARY OF ADVANTAGES OBTAINED IN THE TEACHER, BUILDING AND ADMINISTRATION COSTS COMPONENTS:

Effects on the Teacher Costs: 1) When increasing the number of students/teacher per week during a school shift without changing the teacher/student ratio in the classroom, a cost reduction is obtained in expenses allocated to payment of teaching salaries. 2) When demand of teaching personnel is decreased, the expenses allocated to personnel training and pension funds decrease.

Effects on Building and Maintenance Costs:

When increasing the number of students/building in a school shift without decreasing the regulated space/student, a cost reduction per enrolled student is reached and maintenance expenses do not increase if enrollment increases.

Effects on Administration Costs:

When decreasing the number of active teachers, the number of required supervisors decreases (considering that their number is established in relation to the number of active teachers), and training and pension fund expenses are thereby reduced without decreasing technical assistance.

ADDITIONAL ADVANTAGES

1. The students in the last year of a given level could obtain some experience from core programs with a different teacher. The flow from one operating structure to another is thereby facilitated. (organizational methods at primary and secondary levels).
2. Teachers could receive in-service training in core teaching without any additional cost and their services could be used at all levels of primary education in the future.
3. In locations where there is a shortage of teachers, a school could be integrated up to the minimum grade level with a smaller number of teachers.
4. Educational systems would be permitted to use the budget they are presently using for teacher salaries, to expand the enrollment without increasing the budget.

LIMITATIONS

1. It could be argued that the quality of education would be sacrificed for the purpose of obtaining unit costs reductions.

2. It could create resistance from educators for having to change their schedule one day during the week.

REQUIREMENTS

The model may be applied in five-classroom schools or in multiples of five and adapts itself better to medium and high density areas than to rural areas.

REQUIREMENTS TO BE MET

1. A school-age population census should be made according to the number of students at each grade level and the number of classrooms per building.
2. Educational legislation, regulating the work load of teachers, should be amended with respect to the hours of contact with students.
3. A publicity campaign should be conducted to show the advantages of the model when there is a shortage of buildings and funds.

Note: The alternative can be established both for a single as well as for a double shift or double schedule.

TABLE 1

TIME AND SPACE DISTRIBUTION FOR 6 GROUPS

(A school with five classrooms and five teachers)

A FIVE-DAY WEEK EDUCATIONAL SCHEDULE

Group	Class-room	WEEKLY SCHEDULE						
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	A	Free	X	X	X	X	X	FREE
2	B	X	Free	X	X	X	X	
3	C	X	X	Free	X	X	X	
4	D	X	X	X	Free	X	X	
5	E	X	X	X	X	Free	X	
6 *	Room Day for Work	A X	B X	C X	D X	E X	Free	

* The sixth group uses a different class room every day; that is, the classroom left available one day per week by each of the groups from the first to the fifth grade.

TEACHING BY RADIO IN SAN LUIS POTOSI *

(MEXICAN CASE)

INTRODUCTION

Latin America has many experiences in the use of the radio for educational programs: adult education, cultural programs, formal education, etc. The case herein presented refers to a formal educational program (primary) offered by radio in the State of San Luis Potosí, Mexico. The "Primary Radio" is an experimental program started in 1969 for the purpose of using the radio to offer fourth, fifth and sixth grades to rural and semi-rural communities with incomplete primary schools (only first, second and third grades).

The following have been the reasons for installing the Primary-Radio:

1. Unsatisfied demand for primary studies in rural zones.
2. Shortage of teachers.
3. Need to reduce unit costs in educational programs.

DESCRIPTION

Background

Public organizations of Mexican education consider that it is impossible to extend primary schooling throughout the country through the traditional teaching systems: one teacher handling one grade in only one classroom.

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* The basic information on this case has been taken from:
Peter I. Spa in A report on the System of Radio Primaria in the State of San Luis Potosí, Mexico, Institute for Communication Research, Stanford University, 1973.

In Mexico, as in many Latin American countries, many schools do not offer all six grades of primary schooling*.

The school age population increases rapidly, the public expenditure for education is getting more and more difficult to finance and society requires more and better educational services for its development.

There is a firm belief that educational technology can contribute to solve the great educational problems. Therefore, the Primary Radio was created in Mexico. It initially reached an area of 50 kilometers around the city of San Luis Potosí, Capital of the State with the same name.

Objectives

The objectives of Primary Radio, as stated by official organizations, are the following:

1. To give opportunity to the school-age children, who live in rural zones, to attend complete primary schols (six grades).
2. To give opportunity to persons over 15 years of age to complete unfinished primary education.

The first objective has really been approached more emphatically.

Operation

Primary radio permits four teachers to handle one complete six-grade primary school. The first three grades have one teacher each and the classes are given in the traditional manner. The 3 higher grades (fourth, fifth and sixth grades) are taught by radio by one teacher.

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* At the beginning of the present decade it was estimated that only 20% of Mexican primary schools were offering complete primary schooling (six grades).

Radio Classes

s chosen according to its importance in the official fourth, fifth and sixth grades.

re given special emphasis are Spanish, Arithmetic, . Somewhat less emphasis in given the to physical iences and some practical activities.

er is classified into:

jects (directed toward the three grades) and bjects (directed toward one of the three grades).

subject is transmitted to one grade, the students of remain in the classroom working in specific tasks.

ns" are recorded by a team of eight teachers from ureau for Audiovisual Education and Information

erial is sent to station XEXQ at the University of the programs are transmitted without charge from In Mexico City the transmissions are made by station ted one hour earlier.

ol day (five class hours), the radio lessons absorb ing which five or six programs of approximately 15 ed. During the other three and a half hours, the dents in the activities initiated and suggested in

ine for teachers is published in a bi-monthly pamphlet io Newsletter" containing the detailed "radio class" s. The publication also contains instructions for teacher and student activities, before, during, and after the transmissions. It also includes suggestions on how to prepare teaching materials. On some occasions, the teachers receive color maps and photographs produced by DGEAD.

The radio-lessons strictly follow the only texts distribuited free of charge by the Ministry of Education for Mexican primary school students.

ADVANTAGES

The main advantage of radio in terms of cost reduction is that it permits an increase of the student/teacher ratio and consequently a decrease of teacher salaries as prorated for each student.

The cost of introducing primary radio is much lower than the annual salaries for the teachers who would have to be contracted to handle each individual grade. This fact alone is a reason to use radio as a teaching device.

Since the production costs are fixed costs and can be distributed among many students, the cost per student decreases as the number of students attended by radio increases.

Other collateral benefits might be:

1. A greater number of children have the opportunity to complete primary schooling.
2. Teacher shortage does not prevent the expansion of educational services.
3. Radio reaches isolated regions.
4. The education offered is uniform and potentially of good quality.

5. Broadcasts reach not only school children, but the general populace who wish to better themselves.
6. The system can be used for other educational activities: agricultural extension, adult education, irrigation techniques, health programs, lectures on hygiene, teacher improvement courses, etc.

DISADVANTAGES

It may perhaps be better to discuss some of the technical and administrative problems of primary radio, problems which could arise if a similar system were to be adopted.

1. Since many of the lessons are standardized and the programs are not renewed, a fourth grade child will also hear the same programs in fifth and sixth grades.
2. Because of a lack of adequate supervision some teachers will not listen to the broadcasts, or they will neglect the activities programmed during the period no classes are being transmitted.
3. Faulty transmission and reception equipment (poor quality or small radios) and a deficient maintenance mechanism may leave the students without classes.
4. If the electricity distribution is not uniform the reception might be poor and in some cases the students will not be able to listen to them.
5. Deficient classroom conditions may affect the sound.
6. Poor distribution of work schedules (for example, if the

"Primary Radio Newsletter" arrives late or does not arrive) leaves the teacher without the proper orientation.

7. Because of the continuous transfer of teachers, students often confront new teachers who are not acquainted with the operating methods of the system.

8. Poor coordination on the part of teachers may cause students not to concentrate on their own work while specific programs are being transmitted to one of the other grades.

EVALUATION AND IMPLICATIONS

Planning for Primary Radio began in August 1969 and broadcasts were initiated in 1970. The initial idea was to have the experiment extended throughout the country. However, in 1973 the Primary Radio only reached the area surrounding the city of San Luis Potosí and one classroom in the Experimental Educational Center in Mexico City.

Undoubtedly technical and administrative problems arose and prevented the expansions of the system.

Referring to cost, a study concluded that in 1972 the annual cost per student was $53.oo (including teacher salaries, equipment, teaching materials and radio expenses in production, distribution and reception). If handled by the direct method (one teacher per grade), the salaries, the equipment and the materials for the same students would have resulted in a yearly cost of $118.oo per student. This computation was made taking into account an enrollment of 2,800 students. It should be noted that with a higher enrollment the unit costs would have been lower.

The adoption of radio as a teaching method should be preceded by a feasibility study and by detailed programming: conditions of the existing infrastructure, possibility of using low cost commercial stations, trained personnel, adequate supervision and maintenance mechanisms.

Technology can really be of much use in solving educational problems; but improvisation can cause irreversible harm and greater damages.

TEACHING BY TELEVISION

(State of Marañón, Brazil)

INTRODUCTION

The idea of using television as a massive teaching method has been accepted by many persons in Latin America.

In 1967, the El Salvador Ministry of Education initiated a reform of the national educational system by adopting the use of television as an important component of that reform. In February 1969, televised classes were introduced throughout the country for seventh grade students. The television classes were a complement to the teacher in charge of a given subject of course.

In Mexico, "tele-secondary" was started in 1966. It consisted of closed circuit transmissions for seventh grade students of an experimental school in Mexico City. In 1967, the transmissions were made in open circuits and reached 304 televison classrooms with over 6,500 students distributed in eight States of the country.

In this case, a less qualified teacher handles the whole group but does not give lessons. The students receive 20-minute tele-classes and devote 40 minutes to do their classwork. The teacher is a coordinator of these classroom activities.

At present, both the El Salvador as well as the Mexican programs have been gradually absorbing more students and expanding to higher grades. These are Latin American examples of the use of instructional television to complement classroom activities.

This paper will describe an experience in the Brazilian State of Marañón*, in which an effort is made to replace the teacher with television. The importance of this experience in minimizing educational costs is evident.

In 1971, Brazil enacted a law to reform the educational system (Federal Law N° 5692) which was applied in the 1972 school year. This reform seeks "to replace the selective and traditional education of the past by a system complying with the labor market demands", which would universalize the equality of opportunities for the whole educational population and which would lower the pressure on higher education, through expansion. The following graph depicts the structure of the Brazilian educational system before and after the 1971 Reform.

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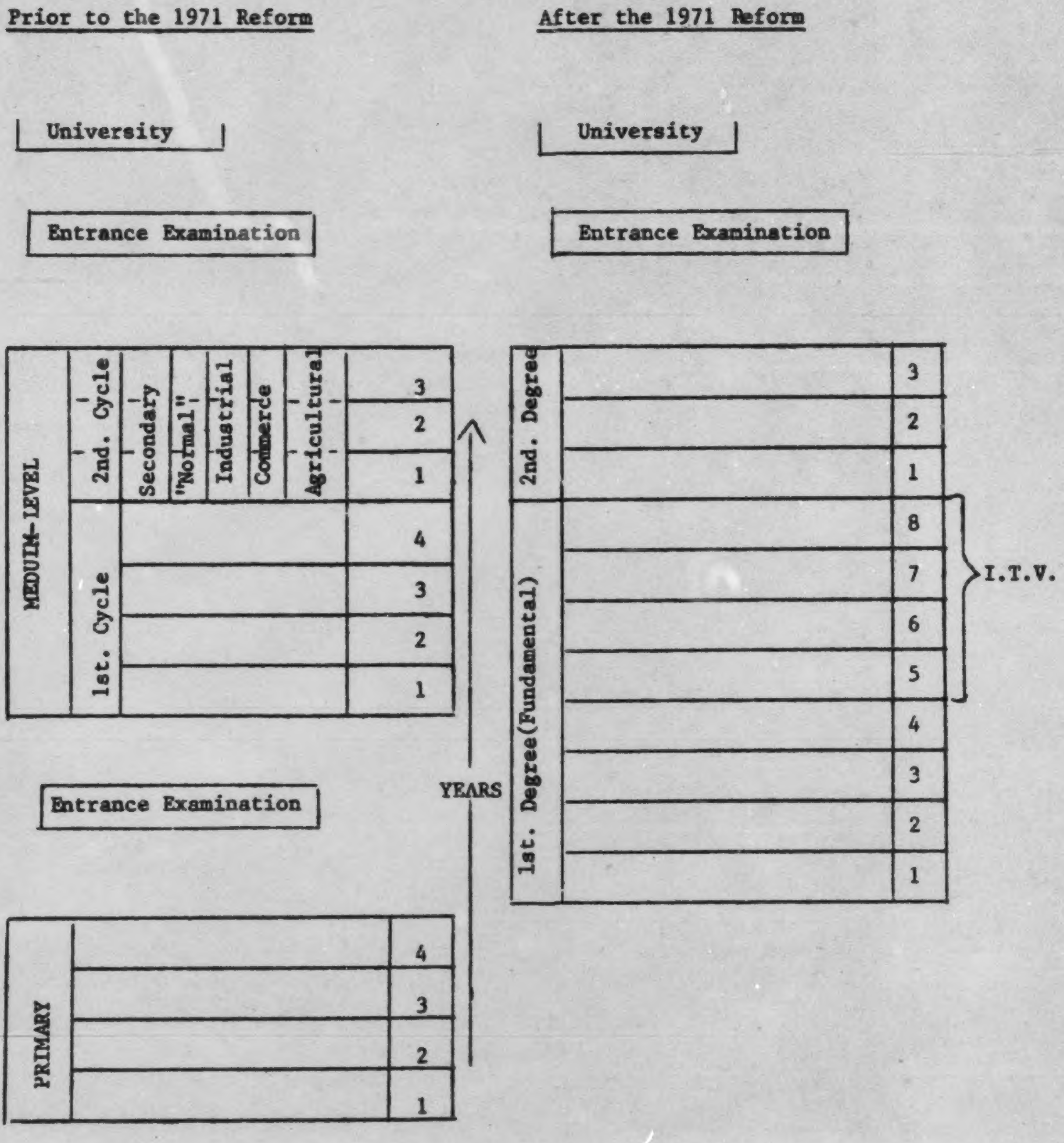
* Brazil has many experiences in educational television (both with national as well as regional scopes) in adult literacy courses or regular courses, but they are complementary and not substitutes for the teachers. However, the information presented concerns the experience of the State of Marañón.

TABLE 2

THE STRUCTURE OF THE BRAZILIAN EDUCATIONAL SYSTEM


Prior to the 1971 Reform
After the 1971 Reform
University
Entrance Examination
MEDUIM-LEVEL
2nd. Cycle
Secondary
"Normal"
Industrial
Commerce
Agricultural
3
2
1
1st. Cycle
4
3
2
1
Entrance Examination
PRIMARY
4
3
2
1
YEARS
University
Entrance Examination
2nd. Degree
3
2
1
1st. Degree(Fundamental)
8
7
6
5
4
3
2
1
I.T.V.

As can be observed in the preceding graph, primary education in Brazil had a four-year study program before the reform. To enter the secondary level the students had to pass an admission examination.

The secondary level had two cycles: the first (Gimnasio) was a four year program, and the second cycle was a three year program diversified as follows: secondary, normal, industrial, commercial and agricultural. The secondary courses were divided into "classical and scientific" and were oriented towards admission to higher education through an admission examination.

The reform of the system brings together primary education and "gimnasio" (lower secondary) in a basic educational level lasting eight years and eliminates the admission examination. The second level (three years) has a uniform curriculom which includes vocational courses.

The Secretariat of Education and Culture of the State of Marañón established televised education without a teacher in the classroom, for the last four years of the first level of the present structure.

DESCRIPTION

In San Luis, State of Marañón, the televised educational program is the basis of the educational process. Even though its application was strengthened upon implementing the 1971 reform, the programs were started as an experiment in closed circuit transmissions.

The program was initiated in the city of San Luis. Later coverage was extended not only to the rest of the State but also to other States. These programs are directed to students of the fifth, sixth, seventh and eighth grades of the first level. They solve two needs which prevented the expansion of the system at this level:

1. Shortage of qualified teachers
2. Shortage of school buildings

At a given moment the need for buildings and classrooms capable of holding more than 50 students could not be anticipated. Together with the shortage of qualified teachers this fact impeded the expansion of the educational system in the present manner. Thus, televised education permitted the handling of a larger enrollment, but the lack of large classrooms did not permit the creation of teleschools, only of tele-classrooms.

Because of this fact groups of students are handled in each course by a monitor, while the teachers of each subject act as coordinators of several groups.

This enables a teacher of any discipline, subject or course to handle about 500 students and not 210 which is the number calculated in many countries for secondary full time teachers (6 groups of 35 students each).

The preceding system shows us that in this case television replaces the teacher in the classroom, permitting him to handle more students now than when there was no television, or when it was used as a complement to the teacher in the classroom.

Unfortunately there is no detailed information available on this recently created program and it seems that it has not been evaluated. There were 16,353 students in 1972 and each group had 50 students handled by one monitor. The tele-classrooms are called "Reception Bases".

EFFECTS ON COST COMPONENTS

Teacher Costs

1. It increases the student/teacher ratio, reducing the average per student salary of the teacher.
2. As a consequence, a reduction in the demand for teachers will represent savings in the expenses assigned to teacher preparation and to retirement fund payments.

Administration Costs

The number of administrative personnel can be reduced. This means savings in the expenses assigned these services. Other reductions are also obtained in expenditures for telephone, water, electricity, paper, etc.

Effects on Building Costs

If the program extends its transmission hours, more students could be handled in the tele-classrooms, thus permitting a greater use of buildings and reduction in the number utilized. There is also the possibility that overage persons could follow courses at their homes. This would represent an enrollment expansion without installation costs.

Effects on the Cost of Educational Materials and Supplies

It decreases the number of the materials needed where the unit is the classroom, for example: blackboards, maps, globes, flannelgraphs, dioramas, etc.

Other Possible Advantages

1. A rapid expansion of the educational system can be effected in very isolated areas, while at the same time it could improve the

quality of teachers in rural areas.

2. Teaching quality might be improved since the lessons are more attractive and up to date.
3. Remedial programs for slow students can be applied, thus decreasing repetition and dropout, and consequently the cost per graduated student.

DISADVANTAGES

1. The quality of the "educational product" may be affected if the programs are not structured in accordance with scientific and technical advances.
2. If regular programming does not exist, the sequence of the courses might be affected.
3. Problems could arise in the electric power supply or interruptions due to inadequate maintenance and repair of the equipment.
4. Classroom discipline could deteriorate. Usually students have greater respect for their teacher than for the monitor.

EVALUATION AND IMPLICATIONS

There is no doubt that television contributes toward improving the quality of education, especially in rural areas where there are few qualified teachers and where there are limited facilities for classroom work (shortage of teaching materials). However, according to the opinion of some planners who were interviewed, it would seem that the presence of the teacher in the rural classroom is very important. Traditions, customs and idiosyncracies are hard to change. It has not been proven that lower costs are obtained by using television instead of the teacher. On the other hand, teaching by television permits a rapid development of educational systems: some times through the extension of an educational level to all school-age inhabitants, and at other times by offering higher levels. Likewise, in-service training can be offered both to teachers as well as to supervisors, thus permitting quality improvement in their work and consequently the achievement of favorable effects on the internal output of the system.

12-MONTH EDUCATIONAL SCHEDULE

(Year-round classes)

INTRODUCTION

For many years, Latin American countries have been experiencing a strong increase in the enrollment demand for primary education. In recent years this has extended to higher levels of education.

This greater demand has required major increases in educational budgets in both for the input "teachers", as well as for investments on buildings, equipment and furniture.

Some countries have not been able to incorporate their entire school-age population into the system. The situation is even worse when repetition and dropout rates are high.

Because of these facts there is an effort to find alternatives which would permit rational use of the space in schools in order to enroll more students and to improve the internal efficiency of the system to reduce the high rates of "educational wastage" (dropout and repetition).

ORIGIN

The alternative referred to in this document is a Brazilian experience which has been applied in several States of that country. The objective is to solve increasing enrollment demand in the face of a shortage of school buildings. It arose as a recommendation from the Basic Education Bureau pursuant to the provisions of Administrative Reform No. 66-269 of March 3, 1970.

is applied in the States of Rio de Janeiro, Bahia,
of the State of Guanabara, in which a 50% increase
f school space has been achieved.

ions in the following manner: for example, a
onstructed with a capacity for 500 students, who will
t (either morning or afternoon). The school period
hs, divided in two 4-month stages with an inter-
cation period at the end of each stage. Three groups
s building as follows:
ttends the morning shift during January, February,
h a vacation in May and June, returning to school
. The group vacations again in November and December.
attends the afternoon shift during the months of March,
with vacation in July and August, continuing in the
finish the four-month period in December, with a
and February of the next year.
tarts its first four-month period in May and terminates
vacations in September and October then continues
to February when their school year terminates. They
rch and April to begin the year in May.
work with a modified shift as follows: during
and December in the mornings, taking advantage of
t by the recess of the first group. During the
ths, the group would attend school in the afternoons,
eft vacant by the second group on vacation.

The preceding organization permits three different groups to use the same location, thus increasing the capacity of the building by 50% without having to resort to a night shift. The 50% increase in the utilization of the building can be explained by the fact that if today there is an enrollment of 1,000 students in a double shift during a nine month period with three months of recess, when enrolling 1,500 students in the proposed reorganization the enrollment would be increased by 500 students which is precisely the 50% increase over the original enrollment.

For a better understanding of this instrument, see the graph on page 47 of the manual.

ADVANTAGES RELATED TO THE EDUCATIONAL COST COMPONENTS

Effects on Building and Equipment Costs

1. The enrollment capacity is increased, permitting a building constructed for 500 students to accept up to triple the number of students per year (1,500) using only the double shift.
2. The utilization rate of the school building is increased; upon increasing the enrollment, the utilization rate of the building is higher, thus producing a decrease in the wastage of physical space.
3. Unit costs for buildings are decreased; upon placing more students in an area built for less students, the cost of the anticipated capacity is lowered. For example, if the previous cost per student was $6.00 it would decrease to $2.00 when placing three students and not one in the same space, although there are also other expenses to be taken into account.
4. There will be an increased use of the furniture, shops and equipment. Some shop tools that deteriorate rapidly through greater use will have to be replaced more often.

Effects on the Costs of Textbooks and Other Teaching Materials

1. If each student has a textbook, the expenses for this item will be reduced in view of an increase in the use of books by students during the year, assuming that any wastage would not be due to greater use but to possible outdating of the books.
2. The use of audio-visual aids increases, thus presupposing a improvement in teaching quality which could result in other savings.

Other Advantages

1. Teacher improvement courses can be conducted in different periods of the year, thus enabling the same or several groups to receive more courses during the year, and this would consequently benefit the output of the system yield.
2. The possibility exists that students who feel they are failing can take some kind of remedial courses during the vacation months or begin the school year again in another group starting at another date.
3. Year-round schooling can help to improve transportation systems in cities. The entire school population will not be using the transportation system during the same period.
4. It can act as a price moderator and improve the efficiency of tourist facilities since there will not be any exaggerated demand for tourist services in any a given period of the year.
5. In countries with ponderous burocracies a staggered set of graduation dates could facilitate the work of administrative offices without having to resort to additional personnel.
6. It can facilitate the modernization of the urban school system through the integration of different educational levels.

DISADVANTAGES

1. It requires a prior expenditure to give some kind of administrative training to the entire personnel. However this expense is only required once.

2. It requires an expenditure to subsidize transportation of students who live far away from the schools who have to leave their local schools because of the administrative reorganization.
3. It could cause problems if there is any disarticulation between the termination of one level and the initiation of the next higher level.
4. It may create problems when brothers and sisters attend different shifts or groups, referring to the fact that in many instances older children take care of their younger brothers and sisters.
5. It may create adverse attitudes from parents, teachers or other community residents because of the disarticulation of the vacation periods.
6. The number of human resources needed by the school system would increase because of the enrollment increases

SOME REQUIREMENTS FOR IMPLEMENTATION

- Easy flow in the transfer from one schedule to another during different periods of the year.
- Curriculum uniformity in the three schedules
- Uniformity in evaluation systems
- Personnel training for the application of the instrument
- Ample publicity campaigns to elicit a possitive attitude from teachers, students and parents
- Implementation of a pilot project
- Awareness of statistical aspects such as:

Enrollment (demand per grade and non-attended demand)

Number of available classrooms and potential availability

Review of the student/teacher and student/classroom ratios

Legal and financial bases

Location of new schools (priority study)

Possibility of new constructions and expansion of existing buildings

New equipment and equipment replacement

Follow-up control of students and others.

EVALUATION AND IMPLICATIONS

Since education is a national task in which not only the Ministry of Education but also other entities which in some way participate in the educational process are responsible, to implement this alternative it is logical that agreements could be made with private or semi-autonomous organizations to take advantage of buildings, equipment and advisory serving (schools, theaters, cinemas, factories, clubs, churches, etc.)

Universities can help do research, evaluation and counseling work related to priorities studies of new buildings and construction standards. Thus it would be possible to design and implement short, medium or long term plans as one of the goals of a national development effort.

Some of the implications resulting from the application of this alternative are caused by the disarticulation produced by the student vacation system, thus suggesting a modification in the vacation dates for all public administration personnel. On other occasions, the climate may prevent the use of the installations during certain months of the year, or during periods of great tourist flows in some Latin American countries.

The lack of qualified teachers will also influence decisions since their number will have to be increased if the student enrollment increases.

Anyway, before implementing this alternative, the advantages and disadvantages offered by it should be exhaustively analyzed, bearing in mind the exploding enrollment and shortages of physical and human capital resources in the majority of Latin American countries.

PRODUCTION OF TEXTBOOKS AND OTHER EDUCATIONAL MATERIALS

INTRODUCTION

The National Foundation for Educational Materials (FENAME) was created in Rio de Janeiro by Law Number 979 enacted on October 20, 1969, to replace the National Campaign for Teaching Materials initiated in 1967. Its objectives are the production and distribution of better quality, low price teaching materials (books, atlases, dictionaries, slides, records and other educational materials).

The Foundation was created for the specific purpose of acting as a price control mechanism, especially in some areas of the interior of the country where no regular market exists. Therefore, according to the legal provisions, the Foundation is a non-profit organization which distributes and sells the materials at cost price throughout the country.

STRUCTURE AND OPERATION

FENAME is a private entity with administrative and financial autonomy; its structural organization consists of an Executive Bureau and two Councils: one Technical Advisory Council and one Fiscal Council. The representatives are appointed by the Minister of Education and Culture.

The techical teams carry out research, editorial planning, analysis of teaching adjustments required by the originals, revision, graphic arts and other technical activities. Publication (paper supply and printing) is handled by private companies through public competitive bidding.

The Foundation produces textbooks for all the basic subjects of primary and secondary education (first and second grades in Brazil) throughout the country, except social studies texts which should be adapted to the characteristics of each region. It also provides dictionaries in several languages, atlases, encyclopedias, records, slides and other teaching materials. Some of the materials are obtained in the local market and redistributed by the institution.

In the 1968-1973 period the Foundation published 105 titles with a total of 8,574,978 copies. It distributed 141 different types of educational materials with a total of 91,256,121 sets, each of them consisting of several units. As an example, in the 1973 period FENAME shops produced around 24 million workbooks.

The Foundation contracts qualified teachers to write textbooks. The texts are revised, graphic arts added and the publications put out for bid. FENAME retains the copyrights to the books, but the authors reserve certain rights for new editions. The authors revise and update their books themselves.

FINANCING AND COSTS

For the 1973 program the Foundation had two sources of financing: annual aid from the federal government and the income produced by the sale of books and other educational materials.

The total 1973 budget amounted to $4,662,379. The federal government contributed 17% and the remaining 83% was produced by the sale of the materials. The program can be self-financed in this way.

The following cost componets are mentioned:

1. Production cost: includes processing, graphic preparation, printing and manufacture;
2. Indirect cost: the sum of administrative expenses;
3. Financial cost: the reinvestment rate and
4. Commercial cost: the distritution quota, auditing and public relations expenses.

From the cost components and categories previously mentioned, only printing, manufacture and the distribution quota are of interest to the private sector. Some educational materials purchased in the local market are excluded.

Due to the period in which the study was conducted, it was not possible to obtain information on the expense distribution for the different cost components, which would have been valuable to determine which of the inputs in a book program uses more resources.

DISTRIBUTION

At present, Rio de Janeiro and Sao Paulo, where the books are usually published, are also the two large distribution centers; the former distributing 60% of the production through a sub-center located in Belén to cover Brasilia and the transamazonic region. The latter (Sao Paulo) covers the rest of the country.

Distribution takes place through agreements made with governmental and private institutions which earn 12% of the book price for this service. Among these institutions are the National Book Institute, the Brazilian

Food Company (COBAL), the Information and Documentation Bureau of the Ministry of Education and Culture, the Federal Educational Council, the National Campaign for Community Schools, the Foundation for Educational books in Sao Paulo, the Physical Education and Sports Division, the Secondary Education Expansion and Improvement Program, the Santo Domingo Foundation, Operation Mauá and the sales stands in universities, private bookstores and those owned by the Foundation.

Books and materials can also be mailed. The weight of the books and a price scale by distances has been established. In this manner they can be ordered directly by enclosing the corresponding value plus the transportation costs. It seems that the books are sent to the different locations in the country using regular government transportation services.

ADVANTAGES

Effects on Material Costs

1. The textbooks are relatively cheap, since the cost per page (including all its components) is only $0.0023. They are made of good materials, thus insuring a useful life.

2. The notebooks and workbooks produced in the FENAME shops are also cheap because paper, which is the expensive material, is obtained at a lower price as it is purchased in large quantities.
3. It seems evident that the Program has been successful in lowering the costs for various materials. For example, some supplies such as student utensils which are not produced by the Foundation,

can be sold by the Foundation much cheaper than in the free market, because wholesale purchases are made. The family budget is thus relieved of some extra burdens.

DISADVANTAGES

If the expenses which should have been covered by the government are transfered to the family budget, this is self-defeating when the goal is really to democratize education by placing it at the reach of everyone.

EVALUATION AND IMPLICATIONS

At the present time the contribution made by Ministries of Education to supply schools with textbooks and educational materials is very limited. The Brazilian program is advantageous for the students because even if it is true that expenses previously covered by the government have been transferred to the family budget, in practice the books and materials can be obtained at prices lower than the present market price.

Also, textbooks requested by schools also vary a great deal, and it is not always possible to determine their value in the teaching process, besides the fact that they cannot be transferred to other members of the family if they are studying at different schools. In the Brazilian program the contents of the books are guaranteed and their updating is insured through an on going revision process which entails financial incentives for the author of the text.

Another difficulty which has arisen in some Latin American countries is the difficulty in distributing the books. This seems to have been overcome in Brazil because the student buys the books at standard prices at sales stands installed throughout the country. Thus, it is insured that students and teachers can obtain teaching materials well ahead of the beginning of the school year.

Some of the implications resulting from a centralized textbook and educational material like that of Brazil lie in the opposition of educators who write books for private companies, and in bookstores and publishing houses which claim that the Government creates detrimental competition, because their sales decrease when textbooks are declared official and when the State manufactures or distributes educational materials.

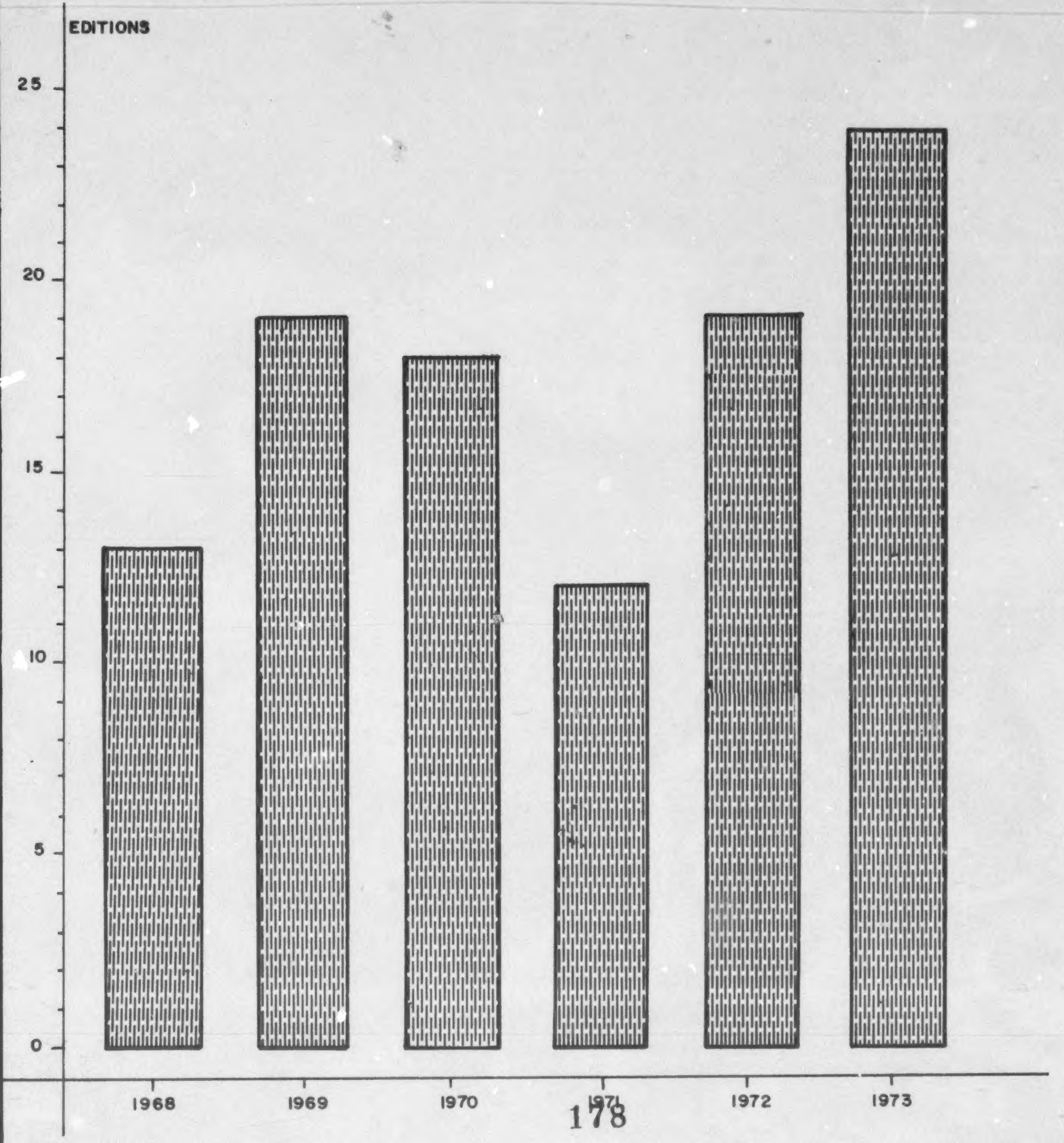
Two graphs are presented to depict the production of books and the distribution of teaching materials during a period of several years:

F E N A M E

Years: 1968 - 1973

PUBLICATIONS: 105 EDITIONS (8,574,978 Copies)

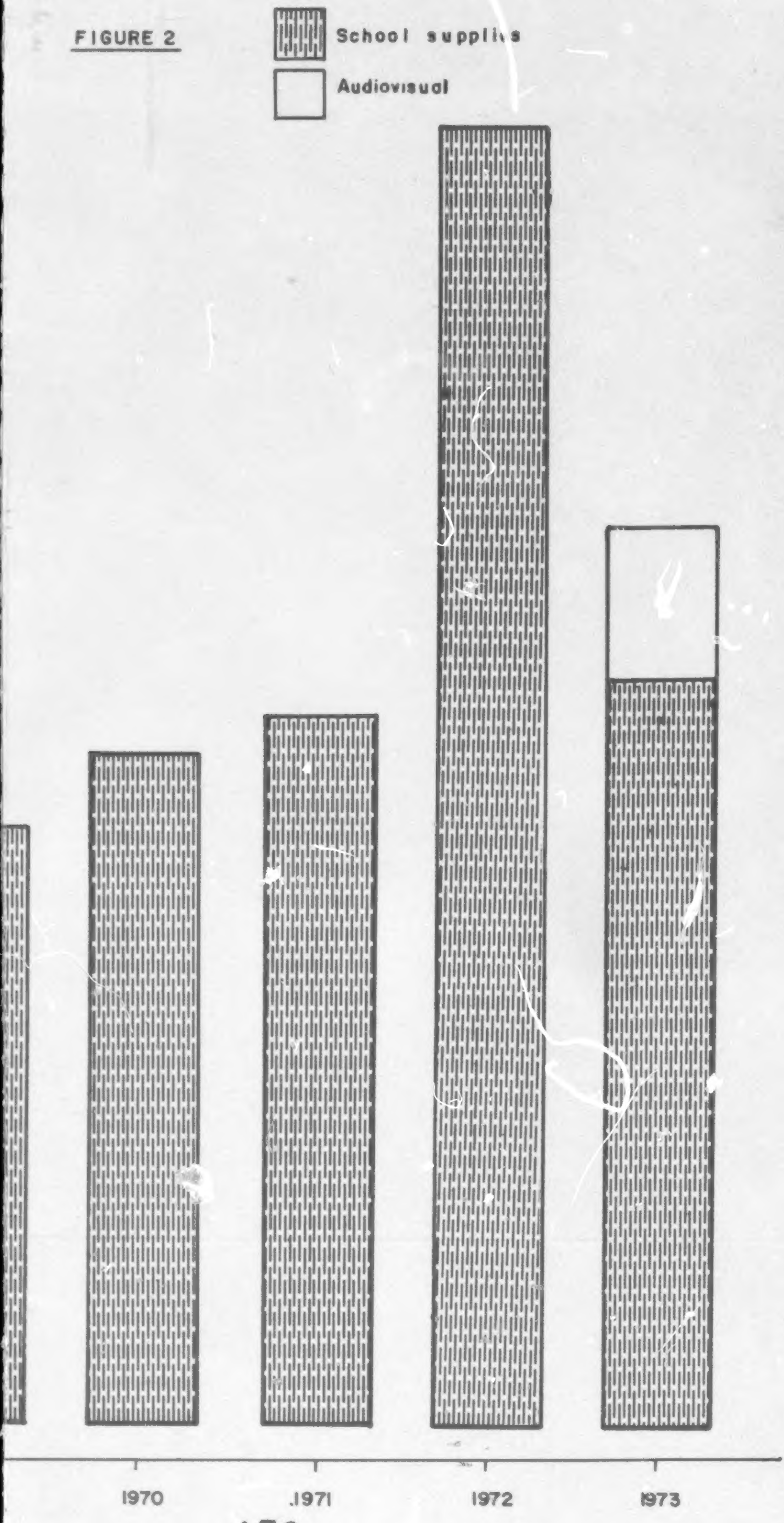
FIGURE 1



MEC / FENAME
Years: 1968 - 1973

PRODUCED: 141 (91,256,121 Units)

FIGURE 2



ANNEX 2

TWO MODELS FOR COST ANALYSIS IN EDUCATION

1. A MODEL TO COMPUTE PRIMARY EDUCATION COSTS (Colombia)

2. A MODEL TO STUDY SCHEDULE LOADS AND UTILIZATION EFFICIENCY BY ACTIVITIES, IN SECONDARY SCHOOLS (Venezuela)

A MODEL TO COMPUTE PRIMARY EDUCATION COSTS

Many models have been constructed to aid in educational planning. As we already know, a model reproduces the actual operation of a system in a given situation. It is a simplified abstraction from reality serving to predict probable consequences resulting from changes introduced into a system, in this case the Educational System.

It should be remembered that models do not represent the real situation with absolute preciseness, only approximately.

It might be advantageous to present a model permitting computation of different educational costs and evaluation of dropout and repeater costs in this chapter.

This model was constructed at the Instituto Colombiano de Pedagogía" (Colombian Pedagogical Institute-ICOLPE) by Doctors Fernán Torres León and Francisco Pereira Rodríguez*.

The model is described as follows: **

First:

$$GT_j^T = \sum_{i=1}^{5} GT^T{}_{ij} \qquad (.0)$$

---

* Fernán Torres León and Francisco Pereira Rodríguez. "Flow, Cost and Marginal Yield Models in Primary Education". Bogotá, Colombian Pedagogical Institute, 1973, Mimeographed. Doc. ICOLPE. 149, 98/IX/73. General Circulation.

** The letters utilized in the Spanish version of the model are retained.

Where:

GT^T = total cost in primary education as per trend in year j

GT^T_{ij} = cost in course i in year j

Then, to compute the total cost per student in year j without considering the dropouts and repeater effects:

$$GNE^T_j = \frac{GT^T_j}{\sum_{i=1}^{5} M^T_{ij}} \qquad (.1)$$

In:

GNE^T_j = net cost per student as per trend in year j

M^T_{ij} = enrollment in course i in year j

Repeaters and dropouts increase the preceding value. This is computed as follows:

$$GBE^T_j = \frac{GT^T_j}{\sum_{i=1}^{5} M^T_{ij} \; (1-r_i - d_i)} \qquad (.2)$$

In:

GBE^T_j = cost per passing student in year j

The difference between the cost per passing student in year j and the net cost per student in year j measures in dollars the wastage dropouts and repeaters represent in primary education:

$$DE_j^T = GBE_j^T - GNE_j^T \qquad (.3)$$

In:

DE_j^T = wastage in the educational system due to dropouts and repeaters in year j.

It is evident that the wastages or losses in primary education due to dropouts and repeaters can be computed for each of the phenomena with equations which are described on the next page.

It should be pointed out, however, that when the dropouts cost is computed it is assumed that a minimum level of knowledge has been acquired, below which this knowledge could not be used beneficially by the student who drops out before reaching that level.

This assumption is highly supported by the labor market itself. In general, when qualified formally educated students are employed, businessmen hire them according to an educational level obtained: primary, secondaryor university level. Those who find themselves in an intermediate educational position (between the end of one level and the beginning of another) are generally classified in the lower level.

The equations are the following:

$$GEPD_j^T = \frac{GT_j^T}{\sum_{i=1}^{5} N_{ij}^T \quad (1-di \quad)} \qquad (.4)$$

In:

$GEPD_j^T$ = cost per passing student in year j without repeating and consequently the dropout cost in year j.

$$CD_j^T = GEPD_j^T - GNE_j^T \qquad (.5)$$

Where:

CD_j^T = drop-out cost (or wastage attributable to this cause in year j)

Therefore, the repeater cost will then be:

$$CR_j^T = GBE_j^T - GEPD_j^T \qquad (.6)$$

Where:

CR_j^T = repeater cost (or wastage attributable to this cause) in year j.

It can easily be proven that the combined effect of dropout plus repetition is the sum of the partial effects:

$$DE_j^T = CD_j^T + CR_j^T \qquad (.7)$$

The two following tables show the application of the model to the Colombian data for 1974/1978. The figures were computed for the primary education aggregate and per student. The magnitude of the costs is sufficient to justify any kind of program which would aim at reducing or eliminating them.

RESULTS OF THE APPLICATION OF THE MODEL ACCORDING TO FACTORS

GLOBAL FIGURES

Year and Sector	Total Enrollment	Passed*	Total Expendit. $ (000)	Actual Expendit. in Pesos	Wastages $	Drop cuts Wastage $	Repeater Wastage $	%of Actual Expend.	% Wast.
1974									
Total	2,968,015	1,923,342	2,168,580	1,405,289,832	763,278,272	289,520,671	473,757,601	64.80	35.20
Rural	1,175,493	571,321	858,874	417,435,688	441,436,883	158,284,483	283,152,401	48.60	51.40
Urban	1,792,522	1,352,021	1,309,706	987,854,144	321,841,388	131,236,188	190,605,200	75.43	24.57
1975									
Total	3,090,069	2,007,445	2,528,696	1,642,752,466	885,925,627	336,186,814	549,738,813	64.96	35.04
Rural	1,216,766	595,861	995,716	487,610,932	523,702,233	199,565,766	324,136,467	48.97	51.03
Urban	1,873,303	1,411,584	1,532,980	1,155,141,534	362,223,394	136,621,048	225,602,346	75.35	24.65
1976									
Total	3,226,031	2,101,572	2,956,754	1,926,153,785	1030,589,893	391,480,832	639,109,060	65.15	34.86
Rural	1,259,915	621,957	1,154,750	570,042,249	601,786,934	230,565,679	371,221,255	49.36	50.64
Urban	1,266,116	1,479,615	1,802,004	1,356,111,536	428,802,959	160,915,153	267,887,805	75.25	24.75
1977									
Total	3,382,578	2,211,273	3,472,250	2,269,893,847	1202,335,468	457,070,129	745,265,339	65.37	34.63
Rural	1,305,774	648,294	1,340,390	665,480,274	693,279,121	266,870,225	426,408,896	49.64	50.36
Urban	2,076,804	1,562,979	2,131,860	1,604,413,573	509,056,347	190,199,904	318,856,443	75.25	24.75
1978									
Total	3,550,020	2,331,600	4,081,458	2,680,540,520	1400,801,964	532,793,916	868,008,048	65.68	34.32
Rural	1,352,479	677,834	1,554,945	779,305,750	794,760,365	307,634,961	487,125,404	50.12	49.88
Urban	2,197,541	1,653,766	2,526,513	1,901,334,770	606,041,599	225,158,955	380,882,644	75.26	24.74

* Adjusted figures

RESULTS OF THE APPLICATION OF THE MODEL ACCORDING TO FACTORS

DATA PER STUDENT

Years and Sector	Total Expen dit. $(000).	Total Enrollment	GNE^T	GBE^T	GEPD	DE^T	CD^T	CR^T
1974								
Total	2,168,580	2,968,015	730.65	1,127.50	881.18	396.85	150.53	246.32
Rural	850,874	1,175,493	730.65	1,503.31	1,007.70	772.66	277.05	465.61
Urban	1,309,706	1,792,522	730.65	968.70	827.72	238.05	97.07	140.98
1975								
Total	2,528,696	3,090,069	818.33	1,259.65	985.80	441.32	167.47	273.85
Rural	995,716	1,216,766	818.33	1,697.23	1,153.25	878.90	334.92	543.98
Urban	1,532,980	1,873,303	818.33	1,074.94	915.12	256.61	96.79	159.82
1976								
Total	2,956,754	3,226,031	916.53	1,406.92	1,102.81	490.39	186.28	304.11
Rural	1,154,750	1,259,915	916.53	1,884.10	1,287.24	967.57	370.71	596.86
Urban	1,802,004	1,966,116	916.53	1,206.33	1,025.28	289.80	108.75	181.05
1977								
Total	2,472,250	3,382,578	1.026.51	1,570.24	1,233.21	543.73	206.70	337.03
Rural	1,340,390	1,305,774	1.026.51	2,095.90	1,438.16	1,069.39	411.65	657.74
Urban	2,131,860	2,076,804	1.026.51	1,352.20	1,148.20	325.69	121.69	204.00
1978								
Total	4,081,458	3,550,020	1.149.70	1,750.49	1,378.21	600.79	228.51	372.28
Rural	1,554,945	1,352,479	1.149.70	2,322.20	1,603.55	1,172.50	453.85	718.65
Urban	2,526,513	2,197,541	1.149.70	1,516.16	1,285.84	366.46	136.14	230.32

GNE^T = Yearly expenditure per enrolled student
GBE^T = Yearly expenditure per passing student
GEPD^T = Expenditure per passing student without considering repeaters
DE^T = Total wastage per student per year
CR^T = Wastage due to repetition and per student per year
CD^T = Wastage due to dropout and per student per year.

MODEL TO STUDY SCHEDULE LOADS AND UTILIZATION EFFICIENCY BY ACTIVITIES, IN SECONDARY SCHOOLS (VENEZUELA)

1. OBJECTIVES

This study seeks to establish present secondary school space utilization in order to determine:

1.1 The maximum number of students that can be supported with the number of classrooms, laboratories and shops available at present.

1.2 The possibility of adding more groups of students than those handled in 1969-1970.

1.3 Possible school expansion needs.

1.4 The priority to be granted to the area where the school is located within the educational building program.

2. METHODOLOGY

2.1 Information

2.1.1 The present curriculum which establishes the number of classroom lecture hours in each subject and the number of hours in laboratories and in workshops.

2.1.2 The statistical reports from each school, which gather information on enrollment and number of sections per course, number of classrooms, number of laboratories and number of workshops. This information is gathered by the Director of each school, and sent to the Statistical Section of the Planning Office, which describes the situation as observed during the months of June (initial) and October (final) of each school year.

2.2 Hypothesis

The following assumptions are established to reach the proposed objectives:

2.2.1 All schools may operate eight hours daily, five days per weeks. A 40-hour week is considered as 100% efficiency in the utilization of the teaching facilities.

2.2.2 All schools require a minimum period of time for cleaning, maintenance, order, arrangement of teaching materials, etc.

2.2.3 Since the teaching personnel determine certain limitations in educational schedules, the following are taken as operating efficiencies:

a. For Lecture Classes:

32 hours weekly or 80%.

b. For Laboratories:

28 hours weekly or 70%.

c. For Workshops

24 hours weekly or 60%.

2.3 The Model *

If designated:

X_i^t = number of lecture hours required weekly to handle the enrollment of all sections of course "i".

N_i^t = number of weekly lecture hours established by the curriculum in force for course "i".

---

* The symbols utilized in the Spanish version are used here.

X_i^e = number of weekly hours in practical laboratory experiments for the groups taking course "i".

N_i^e = number of weekly hours in practical laboratory work established by the study program for course "i".

X_i^p = number of weekly hours in workshops for groups in course "i".

N_i^p = number of weekly hours established by the curriculum for workshops in course "i".

A = number of lecture classrooms existing in the school.

L = number of laboratories existing in the school.

T = number of shops existing in the school.

S_i = number of course "i" sections handled in the school.

i = courses (1, 2, 3, 1C, 2C, 1H, 2H).

E^t = % of lecture classroom utilization efficiency.

E^e = % of laboratory utilization efficiency.

E^p = % of workshop utilization efficiency

$\sum X^t$ = total number of weekly lecture hours needed to handle all the sections in the school.

$\sum X^e$ = total number of weekly laboratory hours needed to handle all the sections in the school.

$\sum X^p$ = total number of weekly workshop hours needed to handle all the sections in the school.

X^{to} = total number of weekly lecture hours made possible by the total number of classrooms in the school.

X^{eo} = total number of weekly experimentation hours made possible by the total number of laboratories in the school.

X^{po} = total number of weekly workshops hours made possible by the total number of shops in the school.

t = lecture areas

e = experimentation areas

p = exploration areas

(In the Venezuelan educational structure):

1. = first year

2. = second year

3. = third year

1C. = first year of Science

2C. = second year of Science

1H. = first year of Humanities

2H. = second year of Humanities

Results:

$$\sum X^t = (X_1^t + X_2^t + X_3^t + X_{1c}^t + X_{2c}^t + X_{1H}^t + X_{2H}^t)$$
$$\sum X^e = (X_1^e + X_2^e + X_3^e + X_{1c}^e + X_{2c}^e)$$
$$\sum X^p = (X_1^p + X_2^p + X_3^p)$$

$X^{to} = 40 \times 0.8 \times A$

$X^{eo} = 40 \times 0.7 \times L$

$X^{po} = 40 \times 0.6 \times T$

Where:

$$X_i^t = N_i^t \; S_i$$

$$X_i^e = N_i^e \; S_i$$

$$X_i^p = N_i^p \; S_i$$

Then:

$$E^t = \frac{\sum X^t}{40\ A} \,.\, 100$$

$$E^e = \frac{\sum X^e}{40\ L} \,.\, 100$$

$$E^p = \frac{\sum X^p}{40\ T} \,.\, 100$$

How:

$E^{to} = 80\%$ (by hypothesis)

$E^{eo} = 70\%$ (by hypothesis)

$E^{po} = 60\%$ (by hypothesis)

the efficiencies obtained may be compared; and likewise the capacity obtained through the values of

X^{to} and $\sum X^t$

X^{eo} and $\sum X^e$

X^{po} and $\sum X^p$

Careful application of this model would permit drawing conclusions and making recommendations regarding capacity, efficiency and eventual expansion of schools.

ANNEX 3

SEVERAL TABLES WITH STATISTICS ON LATIN AMERICA

Table 1: TOTAL POPULATION - 1960, 1965, 1970 AND GROWTH RATES 1960-70

Table 2: POPULATION BY AGE GROUPS 1960 AND 1968 IN LATIN AMERICA

Table 3: ENROLLMENT IN PRIMARY SCHOOLS - 1960 AND 1971, AND RATES OF GROWTH

Table 4: ENROLLMENT IN SECONDARY SCHOOLS - 1960 AND 1971, AND RATES OF GROWTH

Table 5: ENROLLMENT IN HIGHER SCHOOLS - 1960 AND 1971, AND RATES OF GROWTH

Table 6: LITERACY AND PUBLIC EXPENSE IN THE EDUCATION OF COUNTRIES IN LATIN AMERICA

Table 7: PUBLIC EXPENSE ASSIGNED TO EDUCATION AS A PERCENTAGE OF THE GDP IN SOME COUNTRIES

Table 8: RELATION BETWEEN RATE OF POPULATION GROWTH AND STUDENT POPULATION NOT IN SCHOOL AND PERCENTAGE OF THE GDP FOR THE EDUCATION IN LATIN AMERICA, 1970.

TABLE 1

Total population, 1960, 1965, 1970, and growth rates 1960-70

Country	1960	1965	1970	1980	Average annual rates of growth 1960-70
	(Thousand inhabitants)				(percentages)
Argentina	19,937	21,512	23,212	26,938	1.5
Barbados	233	236	238	243	0.2
Bolivia	3,825	4,334	4,931	6,374	2.6
Brazil	69,797	80,465	92,764	121,100	2.9
Chile	7,683	8,260	8,880	10,306	1.5
Colombia	15,397	18,020	21,117	28,935	3.2
Costa Rica	1,254	1,490	1,740	2,407	3.3
Dominican Republic	3,036	3,515	4,067	5,466	3.0
Ecuador	4,358	5,150	6,093	8,[illegible]12	3.4
El Salvador	2,454	2,892	3,424	4,783	3.4
Guatemala	3,810	4,438	5,189	7,042	3.1
Haiti	3,574	3,844	4,134	4,798	1.5
Honduras	1,849	2.181	2,582	3,607	3.4
Jamaica	1,613	1,738	1,872	2,173	1.5
Mexico	35,022	41,452	49,090	68,580	3.4
Nicaragua	1,420	1,629	1,868	2,462	2.8
Panamá	1,062	1,233	1,434	1,927	3.0
Paraguay	1,751	1,982	2,223	2,874	2.6
Peru	10,170	11,478	12,953	16,420	2.4
Trinidad and Tobago	831	923	1,026	1,263	2.1
Uruguay	2,540	2,715	2,886	3,284	1.3
Venezuela	7,349	8,691	10,258	14,[illegible]31	3.5
LATIN AMERICA	198,965	228,178	261,981	343,825	2.8

Source: IDB, based on official country statistics.

TABLE 2

Population by Age Grupos 1960 and 1968 (thousands) in Latin America

AGE GROUP (years)	POPULATION	
	1960	1968
0 - 4	35,692	44,024
5 - 9	29,703	37,351
10 - 14	24,907	32,178
15 - 19	20,946	27,178
20 - 24	17,933	22,665
Total 0 - 24	129,181	163,390
Total Latin America	213,422*	267,668
Percentage of the population between 0 - 24 years in relation to the total	60.53	61.04

* This total does not coincide with the one oppearing in Table 1 of this same Appendix. This is due, probably, among other things, to the the fact that this table includes Cuba.

Source: Edgar Faure, et. al, Aprender a Ser, 1973, p. 376.

TABLE 3

Enrollment in primary schools, 1960 and 1971, and rates of growth

Country	1960 Students enrolled (thousands)	1960 Percent of population 5-14 years of age	1971 Students enrolled (thousands)	1971 Porcent of population 5-14 years of age	Rates of growth 1960-71 (percentages)
Argentina	2,948	71.5	3,672	81.2	2.0
Bolivia	400	43.0	747	60.5	5.8
Brazil	7,477	38.3	13,580	53.0	5.6
Chile	1,186	65.2	2,200	88.4	5.8
Colombia	1,690	40.0	3,137	52.2	5.8
Costa Rica	203	56.5	375	68.7	5.7
Dominican Republic	504	56.9	775	60.2	4.0
Ecuador	596	51.6	1,070	61.2	5.5
El Salvador	321	47.4	566	56.9	5.3
Guatemala	278	25.4	570	38.3	6.7
Honduras	205	38.4	393	53.1	6.1
Mexico	4,885	51.8	9,248	62.6	6.0
Nicaragua	145	35.2	310	50.8	7.2
Panama	162	57.8	289	71.9	5.4
Paraguay	305	63.2	445	65.2	3.5
Peru	1,440	54.5	2,921	81.3	6.6
Uruguay	320	70.5	414	76.8	2.4
Venezuela	1,223	60.9	1,830	62.9	3.7
TOTAL[a]	24,288	47.6	42,542	60.6	5.2

[a] Excludes Barbados, Haiti, Jamaica, and Trinidad and Tobago.

Source: AID, Summary Economic and Social Indicators-18 Latin American Countries: 1960-71, Washington, D.C., 1972.

TABLE 4

Enrollment in secondary schools, 1960 and 1971, and rates of growth

Country	1960		1971		Rates of growth 1960-71
	Students enrolled (thousands)	Percent of school-age population[a]	Students enrolled (thousands)	Percent of school-age population[a]	(percentages)
Argentina	563	30.7	1,008	44.8	5.4
Bolivia	55	11.3	97	23.8	5.3
Brazil	1,238	10.9	4,560	27.4	12.6
Chile	221	24.6	366[b]	45.9	4.7
Colombia	254	12.0	587[b]	21.1[b]	11.0[c]
Costa Rica	28	19.7	85	37.6	10.6
Dominican Republic	31	7.6	118	18.8	12.9
Ecuador	69	8.5	235	19.4	11.8
El Salvador	34	12.9	90	22.7	9.2
Guatemla	27	5.3	80	11.0	10.4
Honduras	15	7.6	46	14.3	10.7
Mexico	351	7.4	1,220	16.9	12.0
Nicaragua	12	7.7	55	21.9	14.8
Panama	39	29.3	88	46.6	7.7
Paraguay	25	11.2	64	18.4	8.9
Peru	198	14.3	723	39.3	12.5
Uruguay	89	36.2	174	57.4	6.3
Venezuela	183	24.9	547	45.1	10.5
TOTAL	3,432	12.9	10,143	27.3	10.5[e]

[a] Age limits of the population which must attend secondary schools vary from country to country between a minimum age of 11 years and a maximum of 20, with the group most frequently found being in the 13-18 years of age range, depending upon the number of years of schooling. In each case, the estimates have ben made on the basis of population groups beginning with the legal starting age for secondary school and extending the number of years needed to graduate from such schools.

[b] 1968. [c] 1960-1968. [d] Excludes Barbados, Haiti, Jamaica and, Trinidad and Tobago.

[e] Excludes Colombia also.

Source: AID, Summary Economic and Social Indicators-18 Latin American Countries: 1960-71, Washington, D.C. 1972.

TABLE 5

Enrollment in higher schools, 1960 and 1971, and rates of growth

Country	Number of students 1960	Number of students 1971	Rates of growth 1960-71 (percentages)
Argentina	173,935	321,782	5.8
Bolivia	9,638	16,300[a]	5.4[b]
Brazil	95,700	484,000	15.9
Chile	24,703	96,490	13.2
Colombia	24,600	86,885	12.2
Costa Rica	6,803	17,000	8.7
Dominican Republic	3,448	22,000	18.4
Ecuador	9,361	40,000	14.1
El Salvador	2,204	9,310	14.0
Guatemala	5,238	17,358	11.5
Honduras	1,760	5,621	11.1
Mexico	78,000	248,211	11.1
Nicaragua	1,267	9,381	20.0
Panama	3,600	13,975	13.1
Paraguay	3,425	8,196	8.3
Peru	35,000	118,400	11.7
Uruguay	15,000	20,600	2.9
Venezuela	26,477	86,891	11.4
TOTAL[c]	520,159	1,622,400	10.8

[a] 1970. [b] 1960-70.

[c] Excludes Barbados, Haiti, Jamaica and Trinidad and Tobago.

Aource: AID, Summary Economic and Social Indicators-18 Latin American Countries: 1960-71, Washington, D.C., 1972.

TABLE 6

Literacy and Public Expense in the Education of countries in Latin America*

COUNTRY	Literacy Index (%)	Percentage of the Public Expense in Education
Argentina	94.0	16.3
Barbados	97.4	21.5
Bolivia	39.8	16.8
Brazil	67.9	6.5
Chile	86.0	18.6
Colombia	78.5	16.5
Costa Rica	85.7	25.4
Ecuador	71.1	22.5
El Salvador	59.6	31.3
Guatemala	37.9	18.3
Haiti	26.0	11.3
Honduras	47.3	21.3
Jamaica	81.9	18.3
Mexico	76.2	24.3
Nicaragua	57.0	18.0
Panama	79.4	22.7
Paraguay	80.0	14.4
Peru	67.7	20.7
Dominican Republic	67.2	15.0
Trinidad and Tobago	95.0	19.0
Uruguay	90.4	26.0
Venezuela	77.1	18.3

* This information was taken from the Annual Report for 1972, "Social and Economic Progress in Latin America", prepared by the Interamerican Development Bank. Not all the figures correspond to 1972, but to the most recent year they had information available. This report excludes Cuba.

TABLE 7

Public Expense Assigned to Education as a Percentage of the GDP in some Countries

COUNTRY	YEAR	% GDP
Brazil	(1968)	3.1 %
Costa Rica	(1969)	6.4 %
Chile	(1969)	4.8 %
Panama	(1969)	4.6 %
Peru	(1969)	4.2 %
Venezuela	(1969)	4.5 %

Source: UNESCO, Paris, October, 1971.

TABLE 8

Relation between rate of Population Growth and Student Population not in School and Percentage of the GDP for the Education in Latin America. 1970.

COUNTRIES	Annual Rate of Population Growth (1960-70) in %	GDP per capita in dollars 1970	% of the GDP assigned to education 1970	Student population not in School* 1970
Ecuador	3.6	259	4.0	32.8
Costa Rica	3.4	543	6.4	20.1
Honduras	3.4	271	3.2	43.5
Paraguay	3.4	250	2.1	34.9
Venezuela	3.3	993	4.5	25.8
Peru	3.2	438	4.3	22.1
Mexico	3.2	692	2.5	27.1
El Salvador	3.2	298	3.6	38.0
Colombia	3.2	346	2.3	37.7
Nicaragua	3.0	457	2.6	44.7
Panama	2.9	732	4.6	19.6
Brazil	2.9	392	3.2	34.6
Guatemala	2.9	361	2.0	60.8
Bolivia	2.9	206	3.6	39.4
Dominican Republic	2.8	357	3.2	27.7
Argentina	2.0	1015	3.5	6.8
Haiti	2.0	94	1.4	74.9
Jamaica	1.5	653	4.4	17.8
Uruguay	1.3	826	3.7	3.9
Chile	1.3	879	5.7	0.6
Trinidad and Tobago	1.3	892	3.5	2.8
Barbados	0.3	584	6.4	8.4

* The global percentage computed for the total student population at the corresponding primary, secondary and university age level (in relation to goals of 100 %, 40 % and 10 % accordingly).

Source: Final Report of the I National Seminar on Educational Statistics, Peru, 1973, p. 68.